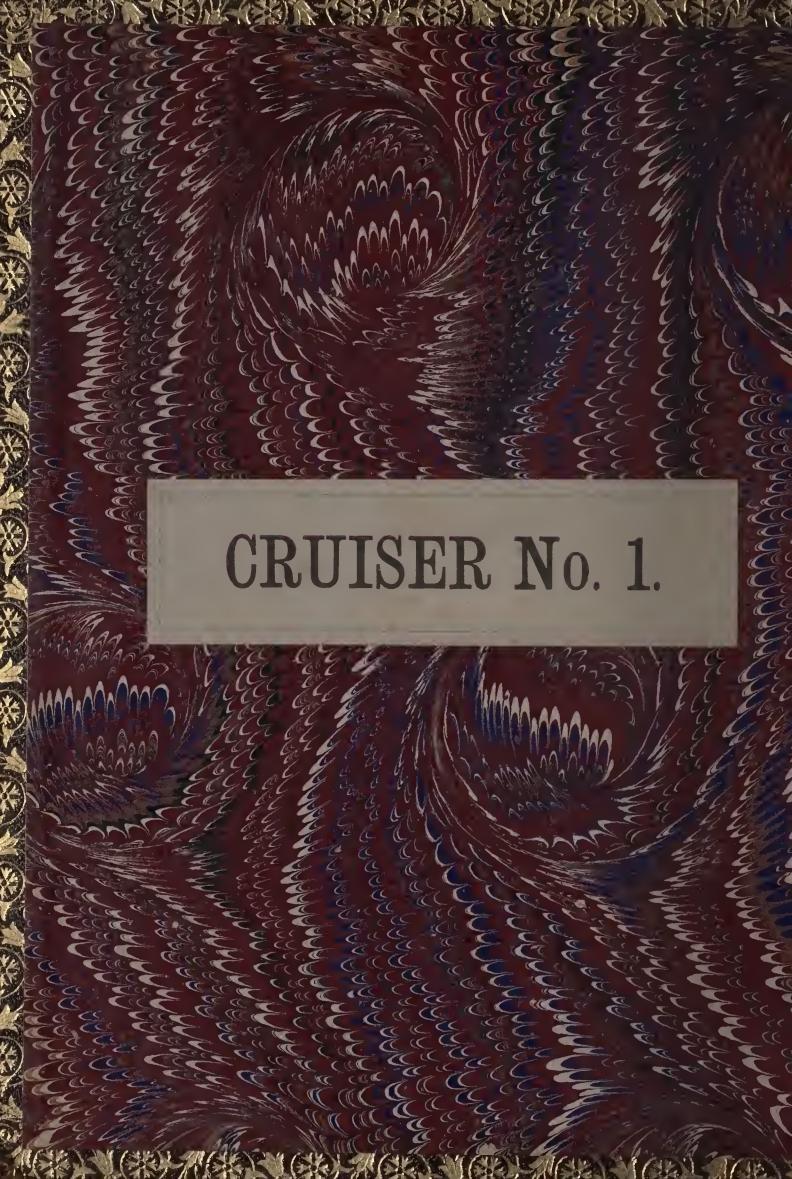
MLCS 92/02163

FT MEADE GenColl

SPECIFICATIONS

FOR BUILDING THE

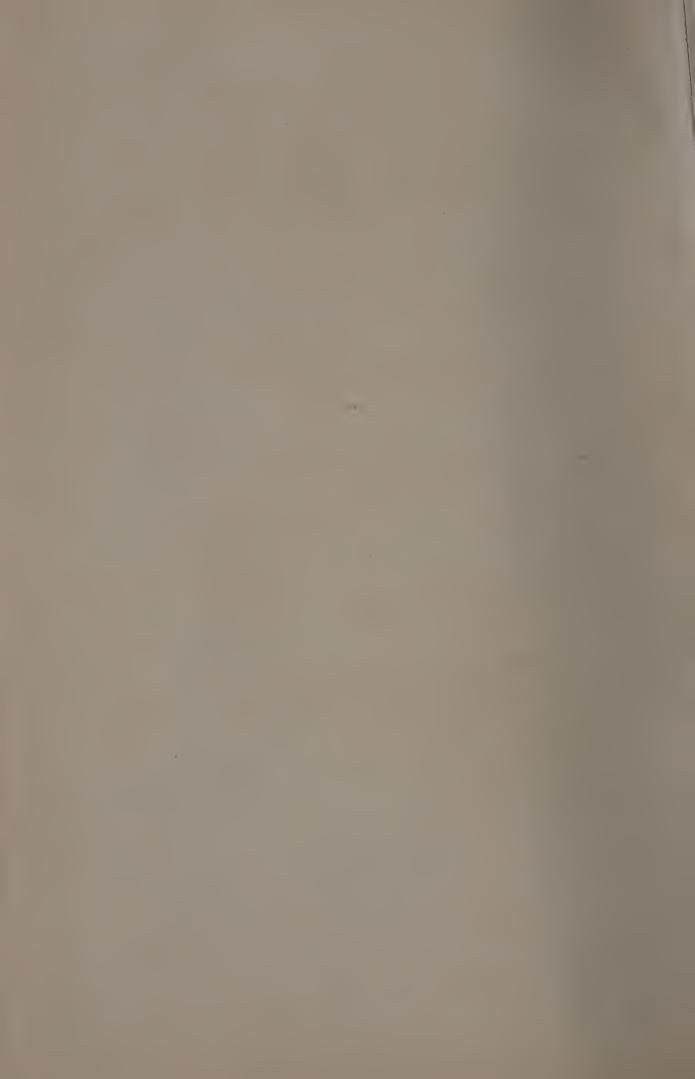
TWIN-SCREW STEEL CRUISER NIEWZARK











il tod Itotes. Navy. Dept.

SPECIFICATIONS

FOR BUILDING A

TWIN-SCREW STEEL CRUISER

UNITED STATES NAVY,

NEWARK.

Bureau of Construction and Repair,

NAVY DEPARTMENT, WASHINGTON, D. C.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1886.

MLCS 92/02163

4 - NOV 8 Copy 1362

76

LIST OF PLANS ACCOMPANYING THESE SPECIFICATIONS.

- No. 1. Sheer, half-breadth and body.
- No. 2. Midship-section.
- No. 3. Cross-sections before and abaft double bottom.
- No. 4. Profile inboard.
- No. 5. Poop and forecastle-decks, bridges, stowage of boats, etc.
- No. 6. Gun-deck.
- No. 7. Berth-deck.
- No. 8. Protective-deck.
- No. 9. Platform.
- No. 10. Hold, magazines, etc.
- No. 11. Expansion plan of inner bottom.
- No. 12. Spars and sails.
- No. 13. Expansion plan of outside plating.
- No. 14. Expansion plan of protective-deck plating.
- No. 15. Bulkheads, fore-and-aft.
- No. 16. Stem and framing.
- No. 17. Stern-post, rudder, and hangers.
- No. 18. Steering-gear.
- No. 19. Stern-tubes.
- No. 20. Longitudinals.
- No. 21. General plan of sluice-valves.
- No. 22. General plan of raising sluice-valves.
- No. 23. General plan of state-room fittings.
- No. 24. Flush hatches.
- No. 25. Raised hatches.
- No. 26. Water-tight doors.
- No. 27. Bilge-keels.
- No. 28. Water-tight coal-scuttles.
- No. 29. Cross-sections at numerous frames. (2 sheets.)
- No. 30. Square air-ports.
- No. 31. Method of securing rigging.

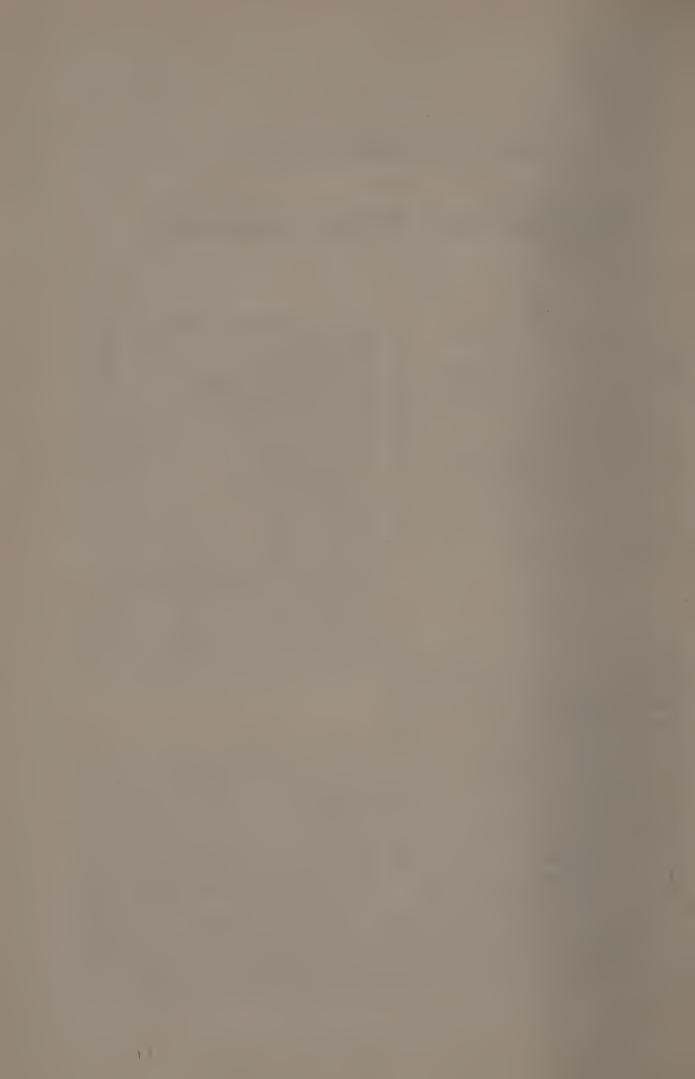


INDEX TO SPECIFICATIONS

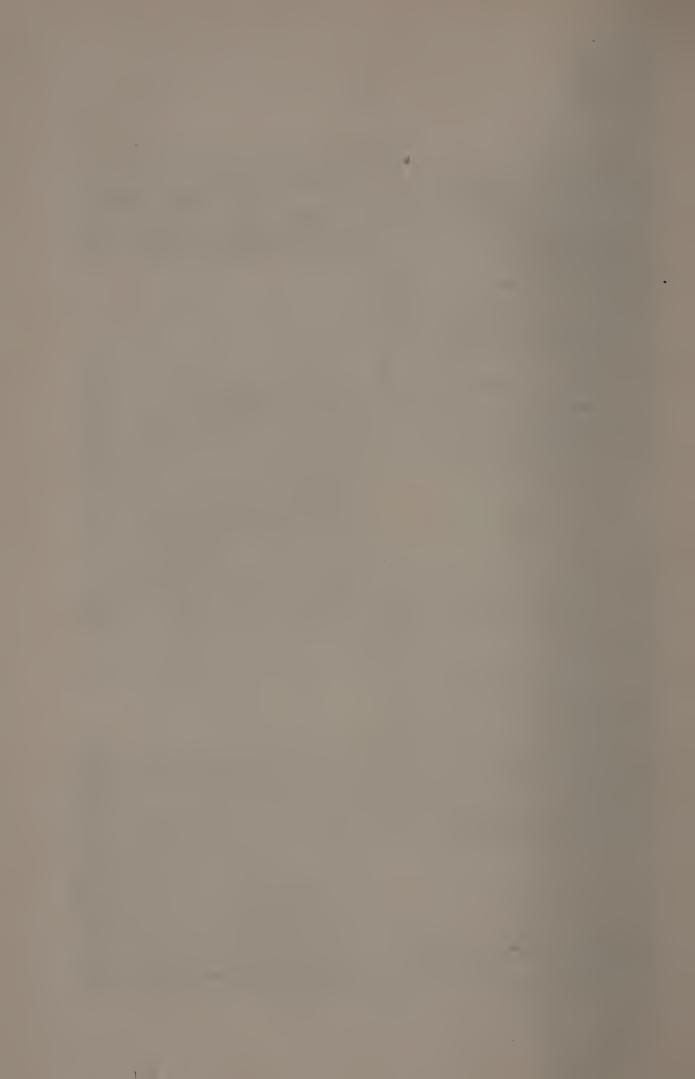
FOR

TWIN-SCREW STEEL CRUISER.

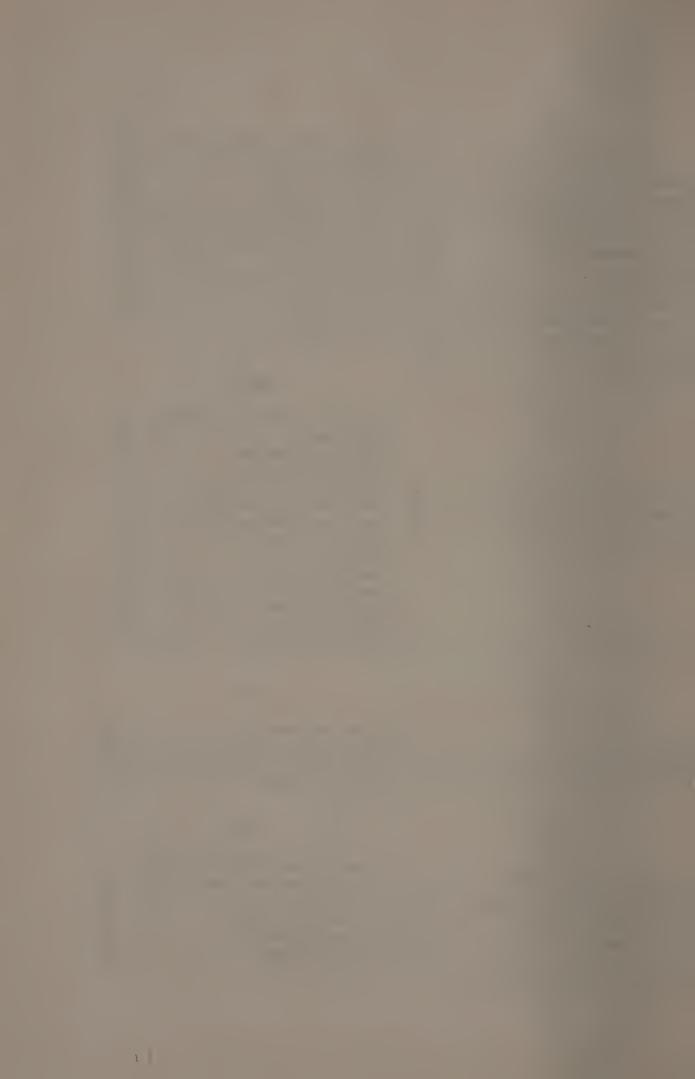
Page,	Page.
	Bitts, warping and towing 47
Articles furnished by Gov't 2	Bill-boards
Air-ports	Bottom, inner 16
Attachments for rigging, &c 38	Boiler-bearers
Alleys, shaft	Boat-davit and cradles 40
Ammunition-room30	Bow-stoppers
Anchor-davits	Bolts, ring in deck
Apparatus, steering	Bolts, seeming
Arrangement of draining, &c. 49	Bolts, lashing
Arrangement, torpedo 32	Booms, swinging
Arms, Master-at, locker 64	Breast-hooks
Armory	Bridge plating
Ash-chutes	Bridge-beams
Awning stanchions 37	Bridge decks
	Bulkheads, W. T. Transverse. 22
	Bulkheads, fore-and-aft, and
Ъ.	coal-bunker23
13.	Buoys, life
Bars, reverse 7	Bunkers, coal, ventilation 56
Bay, sick	Bunkers, fresh air supply-pipes 57
Beam, forecastle and poop-deck 11	zamicze, zacesa dz zappzy pripos or
Beam, gun-deck 12	
Beam, berth-deck	
Beam, protective-deck 12	C.
Beam, platform 12	
Beam, under magazine and	Cabins under poop-deck 61
shell-room 13	Canopies 37
Beam, half, and carlings 13	Cable-bitts 47
Beam, skid	Call-bells, electric 69
Beams, bridge 13	Calking 71
Berth-deck plank 32	Capstan and windlass 45
Berthing hammock 35	Carlings and half-beams 13
Bearers, engine, boiler, and	Ceiling in hold, store-rooms 59
shaft	Cement
Bed, windlass	Chocks for fair-leaders 39
Bell, watch 40	Chutes, ash
Bilge-keels	Chain-lockers 44
Bitts, cable 47	Chronom, and compass lockers. 63



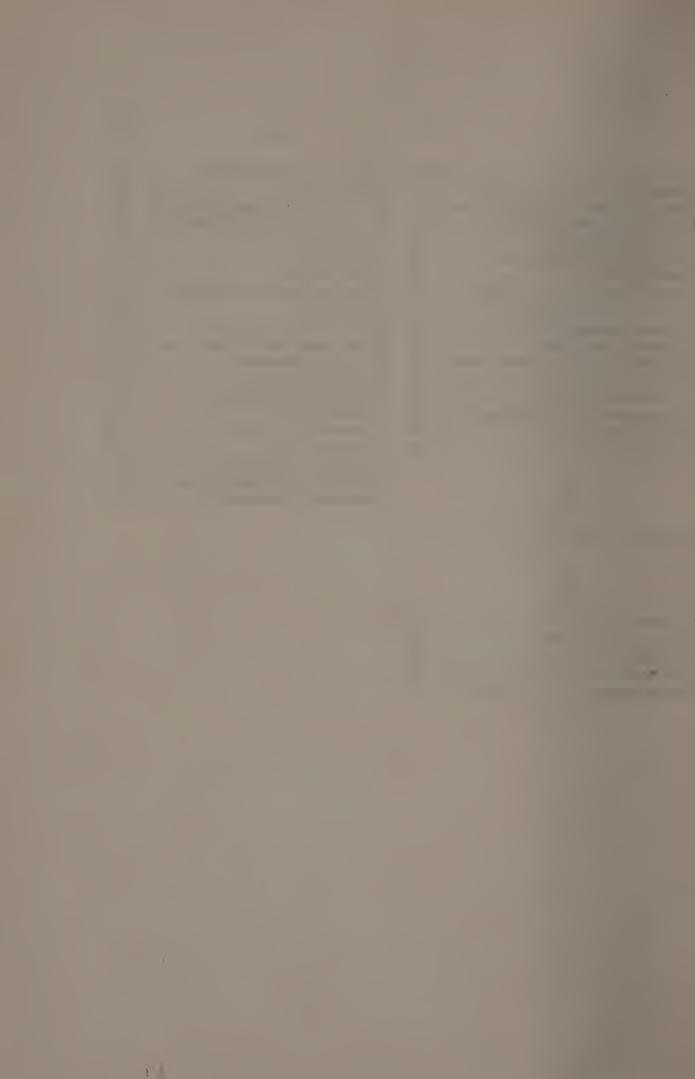
Page.	Page.
Closets, water	Engineers' pipes, holes in bulk- heads, &c
lights	F. Fair-leaders and chocks 39 Fastenings, general 73 Fixed-animunition rooms 30 Figures for draught of water 67 Firemen's wash-room 65 Fife-rails, &c 39 Flat keel 4
Dams, coffer	Flat keelson-plate
Deck-pipes 43 Decks, varnishing 67 Dimensions, principal 1 Dispensary 64 Drawings 3 Drainage and pumping 49 Draught of water, figures 67 Engineers' shop and store- room 64 Ensign staff 40	Galley-house



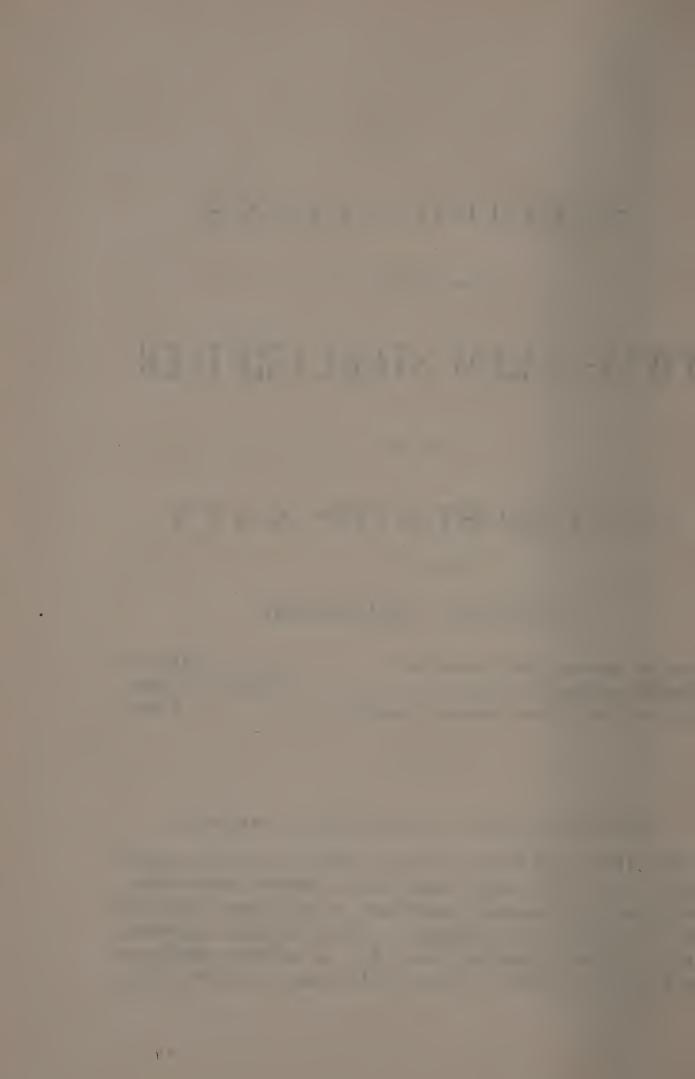
Page.	Page.
Half-beams and carlings	Lavatories for officers, &c
I. Inspector's office	Machinery required in build67Magazines28Magazines, torpedo30Materials2Materials for weighing3Materials, workmanship&c3Master-at-arms' locker64Mast-partners48Manger44Mast, bitts&c39Mast-steps34Mess and clothes lockers66Moldrudder64Musket-racks38
Keels, bilge 27 Keel, vertical 3 Keel, flat plate 4 Keelson, flat plate 15	O. Office, paymaster's
L.	P.
Ladders to hatchways	Painting and otherwise coating steel, iron, and wood-work. 70 Pantries



1'	age.	\mathbf{P}_{t}	ige.
Pipes, engineers'	25	Rivets, &e	78
Pin-rails, &c	39	Rubbing-plates	37
Pilot-house, wood	40	Rudder	7
Pipes, deek		Rudder-mold	6.1
Pipes, warping		Running-lights	
Pipes, hawse		Rumming-rights	05
Pipes, stern			
Plates, brass label			
Plates, rubbing			
Plating outside		S.	
Plating poop and forecastle		D ,	
Plating bridges	18	Sail-room	63
Plating gun-deck	18	Scrittles, escape	45
Plating berth-deck		Scuttles, coal	45
Plating protective-deck		Scuttles, passing	30
Plating platforns20		Schppers	34
Plating magazine and shell		Securing-bolts	48
rooms, &c	28	Shaft-alleys	25
Plank-sheers or waterways		Shaft-bearers, &c	25
Plank, deek		Shaft-tubes and struts	6
Plank, poop and forecastle		Shot-racks	38
Plank, gun-deck	32	Ship, heeling	69
Plank, berth-deck	32	Shell-rooms	30
Plank platforms	32	Signal-lockers	63
Plank, bridge	32	Sick bay	64
Platforms for guns	33	Skid-beams	13
Post, stern	5	Skylights, coaming, &c	36
Ports, freeing	47	Sluice-valves	26
Principal dimensions	1	Sounding-tubes	26
Prisons	64	Sponsons for guns	32
Pumps	52	Speaking-tubes, &c	59
		Steerages	62
		Stoppers, bow	45
		Steering-apparatus	42
$\mathbb{Q}.$		Staff, ensign	40
	*	Store-rooms, general	63
Quality of material, &c	73	Store-rooms, engineers'	64
		Stanchions in hold, &c	25
		Stem	4
.		Stern-post	5
$\mathbb{R}.$		Stringers, deck and plating	17
	00	Store-room torpedo	30
Racks, musket and shot	38	Stanchions, awning	37
Rails, guard and stanchion	38	Stanchions, guard-rail	38
Rails, fife and pin	39	Step, mast	£4 33
Red lead	71	Supporters for guns	
Reels	66	Summary of work for hull	1 39
Rigging, attachments for	38	Swinging-booms	70
Ring-bolts in deck	48	Swinging tables and benches.	10







hawsers, and boats, including steam-windlass and capstans; water and oil-tanks, fitting and stowing the same; all fittings necessary for securing the rigging to hull; all eye and ring-bolts; mess-lockers, clothes-lockers, swinging-tables, and seats for seamen; stepping and securing masts and all portable working parts; fitting galleys, &c., as hereinafter described in these specifications and by the official drawings; and any part of the hull, or article pertaining thereto, except such as are specially mentioned, which may have been inadvertently omitted from these specifications, or from the official drawings, but which is necessary for the proper completion of the vessel, is to be supplied by the contractor without extra charge.

ARTICLES TO BE FURNISHED BY THE GOVERNMENT.

The following articles are to be furnished by the Government, and are not included in nor to be considered as part of

these specifications:

Masts, spars, rigging, sails, blocks, boats, anchors, chain and other cables; galleys, casks, life-buoys; portable furniture, carpets, mattresses, curtains, crockery; ordnance and ordnance outfit of all kinds; torpedo-tubes and gear, and other outfit not specially mentioned, and stores of all kinds.

MATERIAL.

All material used in the construction of this vessel, unless otherwise described, is to be of steel, which must conform to the requirements specified in the "Instructions to Inspectors of Material" at the end of these specifications.

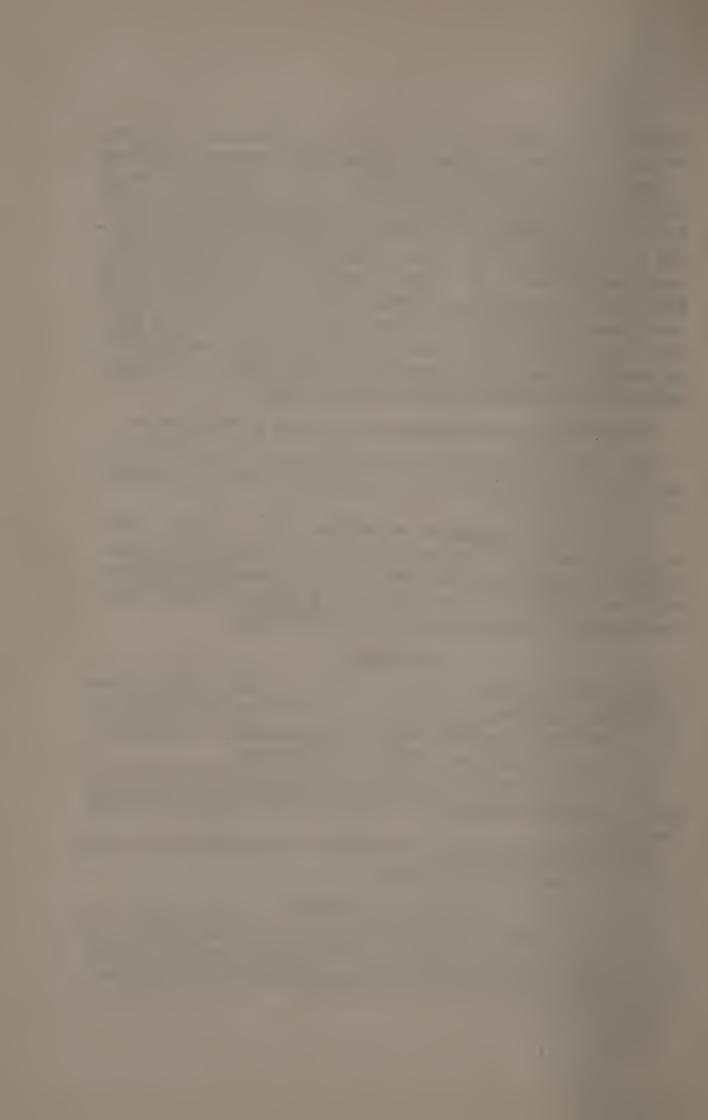
All cast-steel to be subject to percussive or such other tests as will show the casting to be free from flaws and of uniform

strength.

All other material to be of the very best quality; the wood to be well seasoned and selected.

INSPECTOR'S OFFICE.

A suitable office and draughting-room, properly fitted and heated, for use of the inspector of hull and his assistants during the building of the vessel, is to be furnished by the contractor.



DRAWINGS.

All drawings necessary during the progress of the work must be prepared by and at the expense of the contractor. Those which are merely developments of the official drawings and working-plans, in accordance with the specification, will be subject to the approval of the superintending constructor before the material is ordered or the work commenced. All plans involving changes or modifications of the original drawings must be approved by the Chief Constructor. Draughtsmen will be employed by the Bureau of Construction and Repair who will, under the direction of the superintending constructor, make a complete set of plans in detail from measurements taken from the ship, including mold-loft dimensions.

These plans will be forwarded to the Bureau of Construc-

tion and Repair as the work progresses.

WORKMANSHIP.

The workmanship throughout to be of the most thorough character, and particular care is to be taken to insure fair lines, smooth surfaces, and perfect water-tightness.

All plates are to be re-rolled to remove surface irregularities.

Any portion of the work, whether partially or entirely completed, found defective must be removed and satisfactorily replaced without extra charge.

WEIGHING MATERIAL.

All material worked into the hull, and all scrap cut therefrom, is to be carefully weighed and classified in an approved manner, and regularly reported to the Bureau of Construction and Repair through the inspector, who will be required to certify to its correctness.

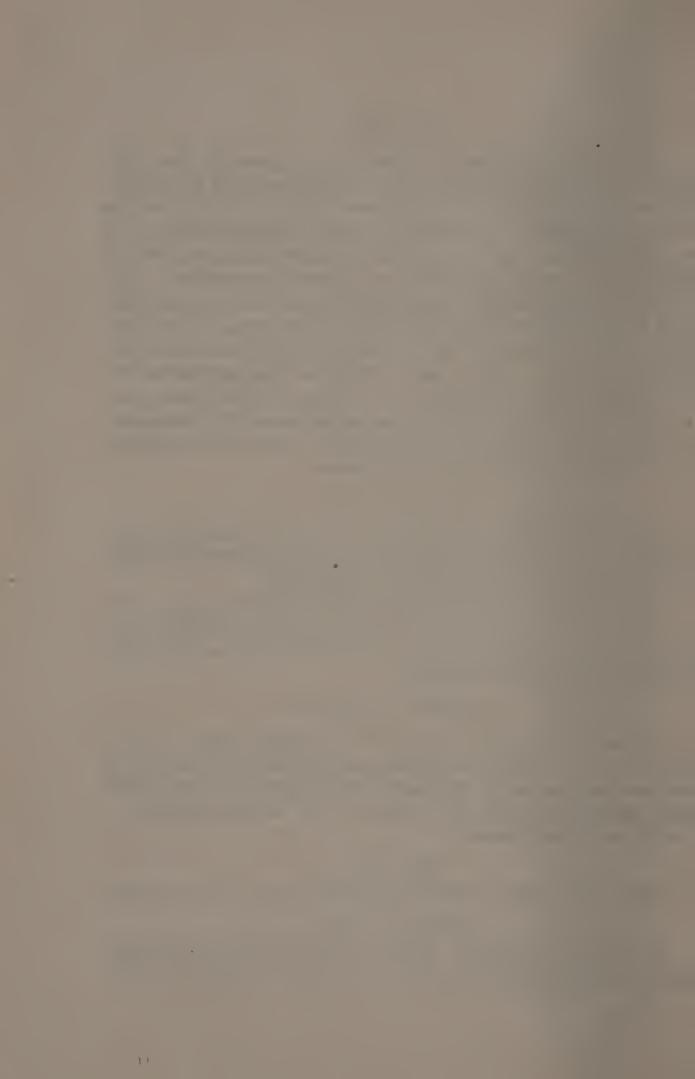
THE HULL.

The details of the vessel's construction are to be as follows:

VERTICAL KEEL.

To be $17\frac{1}{2}$ pounds per square foot, and to extend continuously throughout the length of the vessel; in depth, 39 inches

1



from frame 17 to frame 76, inclusive; forward of frame 17 to be in depth 36 inches, except where it is worked up to the height of horizontal ram-plate, to which it will be suitably connected; abaft frame 76 to be in depth as shown on profile plan.

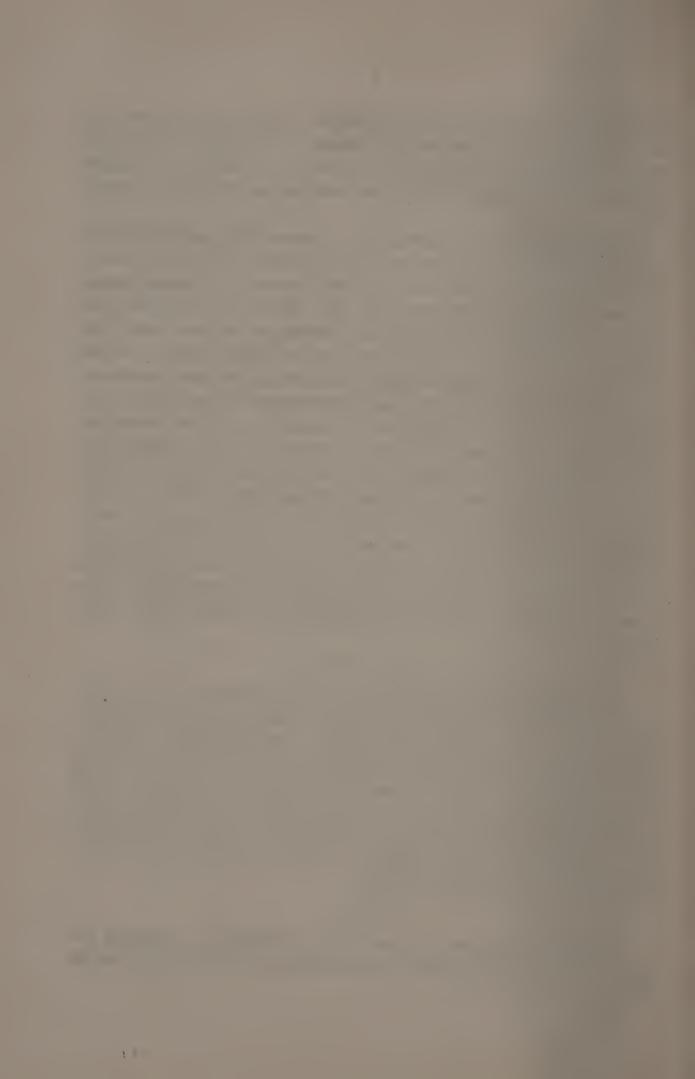
Lightening holes to be cut in the plates before and abaft the double-bottom where there are no butt-straps, the holes not to exceed 18 inches in diameter. The butts to be treble chainriveted, with alternate rivets in the third row omitted, the straps to be double, and each 10 pounds per square foot, their length to be 16½ times the diameter of the rivets, and to extend only between the edges of the angle-bars on top and bottom of the vertical keel. Angles on lower edge of keel-plate to be double, each $3\frac{1}{2}$ x 3 inches of 8 pounds per foot; those on upper edge to be double, each 3 x 3 inches of 7 pounds per foot. Both sets of angles to be continuous, worked in long lengths with well-riveted straps over the butts; those on lower edge to be connected to the stem and foot of stern-post in substantial manner, as shown on the plans. All bars to be worked in the greatest lengths procurable, and the butts well fitted, metal to metal. The vertical keel-plate and angle-bars to be carefully calked and made water-tight within the double bottom.

FLAT KEEL.

To be made of two thicknesses of plate, the outer 20 pounds per square foot, the inner $17\frac{1}{2}$ pounds. The butts to be planed, well fitted, and calked in the most careful manner, metal to metal, and each thickness of plate to have treble-riveted straps the same thickness as the plates, extending from keel angles to edges of plates; their length to be $16\frac{1}{2}$ times the diameter of the rivets. Edges of inner thickness to be single-riveted to the outer thickness; edges of outer thickness to be double-riveted to the garboard-strakes.

STEM.

To be of cast-steel, in two pieces, rabbeted to receive the ends of the bottom plating, the lower end well scarfed to the



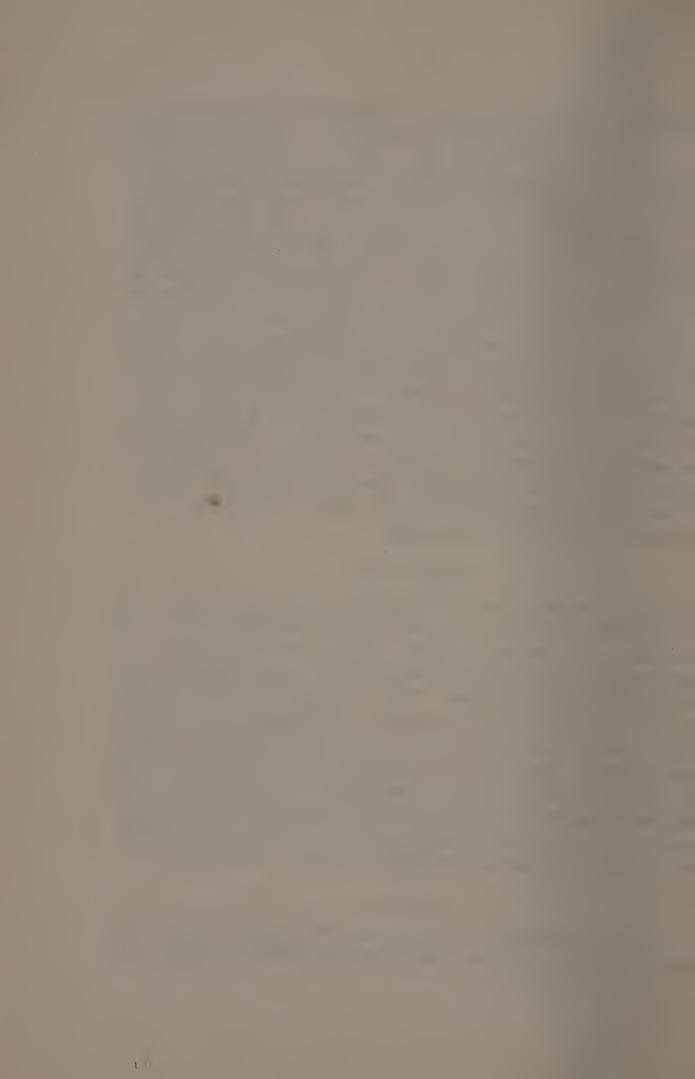
keel-plates, also supported for ramming by attachment to protective-deck and special strengthening. All to be shaped and molded according to the plan. The bow will be strengthened by a horizontal plate 3 inches thick, of the shape, length, and width as shown on the plan of stem and framing; the transverse frames of the vessel will cut off against upper and lower side of this plate, to which they will be strongly connected by plates and angles, the plates to be lightened with holes to give access for painting and cleaning, as shown on the plans. There will be angle-bars 4 x 4 inches of 10 pounds per foot worked all around the ram-plate and on outside of bottom plating; angle-bars 4 x 3 inches of 8 pounds per foot to be also worked opposite these on the inside. The plate, for its entire length, to be covered by a V-shaped plate as shown on the plans, to be 15 pounds per square foot, and tap-bolted to the outside plating and stem; to be filled in solid on both sides with yellow pine, the metal and wood to be thoroughly coated with red lead, cement, or other approved material, and all made water-tight.

STERN-POST.

To be of cast-steel and in two pieces; the upper piece to be in thickness 3 inches, the lower end of which will be well secured to the protective-deck plating, and the upper end connected to the plating of the gun-deck and transom-plate frame on fore side of post. The lower end of lower piece to be well scarfed to the keel-plates, and flanged out on each side to receive the ends of the struts for the support of after ends of shafts, &c., to have lugs formed on the post for taking the rudder, these lugs to be bushed with lignumvitæ. The post to be flanged and bored out for the passage of the rudder-head, and attachment of stuffing-box also fitted for locking-hoop, and all shaped and molded as shown on the plans.

RUDDER.

To be of cast-steel, the least diameter of the head to be 15 inches exclusive of brass sleeve, the side plates to be of steel



12½ pounds per square foot, and filled in between with white pine. The head to be turned and fitted with sleeve and stuff-

ing-box of brass.

A carrier is to be fitted to take the weight of the rudder, and a locking-hoop worked on same on after side of head. The upper pintle to be in diameter 6 inches, middle 5 inches, and lower pintle $4\frac{1}{2}$ inches, all exclusive of brass sleeve. To have a sunken eye-bolt in the head for hoisting. All to be shaped and molded as shown on the plans.

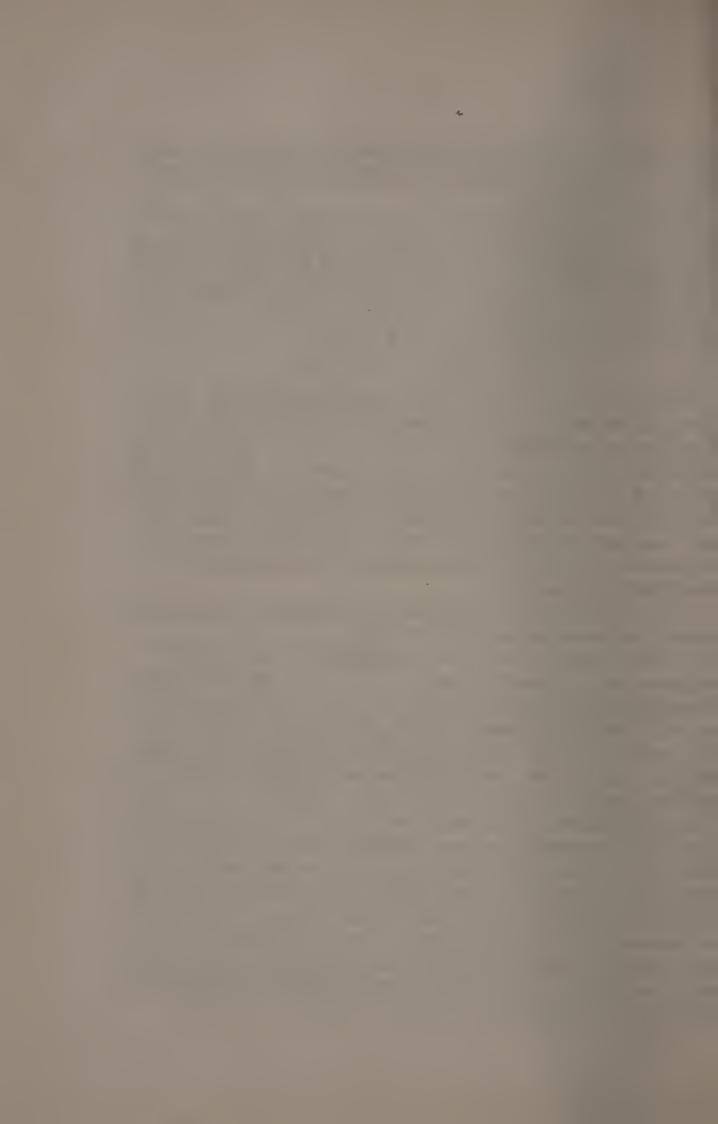
SHAFT TUBES AND STRUTS.

Tubes for the reception of the propeller-shafts to be constructed on each side of the vessel, as shown on the plans. At the forward ends these tubes are to be worked into the form and frame-work of the hull; to be made of cast-steel and provided with flanges or lugs, as required, on the tubes; to be strongly fastened to the frame-work of the vessel, and to permit the easy passage of the water over the junction of the tubes with the hull; the after-ends to be neatly tapered down, as shown on the plans.

The after-tubes to be formed of steel plates 15 pounds per

square foot and not made water-tight.

The shafts and tubes to be supported at the after ends by a strut on each side, these struts to be of cast-steel, the upper arms being continued through the bottom plating and securely riveted to a plate on each side 20 pounds per square foot, worked to the angle of the strut and over several framespaces between the outside plating and protective-deck, to which it will be connected by single angle-bar 4 x 4 inches of 9 pounds per foot, angle-bars 4 x 4 inches of 9 pounds per foot to be worked on the outside around the struts where they pass through the bottom plating; similar angles to be worked on the inside, these angles to be riveted through the outside plating and tap-bolted to the struts. The ends of these struts to be broadened out to the required size and shape and securely riveted to the flanges on foot of stern-post. The struts are to be pear-shaped in section with their thin ends aft; all to be shaped and molded as shown on the plans.



TRANSVERSE FRAMES.

To stand square to the load-line, as marked on the plans, and spaced 36 inches between centers. Below the protectivedeck from frame 31 to frame 74 inclusive, or space occupied by the double-bottom, to be formed, except at solid or watertight frames, of main and reverse angle-bars and bracketplates; the main bars to be $4\frac{1}{2} \times 3$ inches of 9 pounds per foot, and worked continuously from vertical keel-plate to protective-deck; the reverse-bars to be 4 x 3 inches of 8 pounds per foot, and the lower piece within the double-bottom to be worked in short lengths between the longitudinals, and where double reverse-bars are worked under the engines and boilers one bar to be cut off and the other carried on the outer frame-bar; where single reverse-bars are fitted below inner bottom to be joggled over outer frame-bar to take one rivet. Between these outer and reverse-bars bracket-plates $12\frac{1}{2}$ pounds per square foot next the vertical keel, and 10 pounds per square foot elsewhere, will be worked as shown on the midship-section, to be connected to the vertical keel and longitudinals by anglebars $2\frac{1}{2} \times 2\frac{1}{2}$ inches of 5 pounds per foot. In wake of the engines, boiler-saddles, and elsewhere, as may be necessary, special frames are to be introduced, and solid plates lightened with holes substituted for the bracket-plates, as required.

The solid or water-tight frames are to be made of plates 10 pounds per square foot, worked in between the longitudinals, &c., and connected to the keel, longitudinals, and inner bottom and outer bottom plating by staple angle-bars 3 x 3 inches of 7 pounds per foot, the whole to be carefully calked and

made water-tight.

Reverse-bars 4 x 3 inches of 8 pounds per foot will be worked on every frame except at transverse bulkheads, and to extend from cast-steel shoe on top of inner bottom to the protective-deck; a bracket-plate 15 pounds per square foot will be worked on each side on every frame, except where there are transverse bulkheads, as shown on the midship-section; these bracket-plates to be scored out over the cast-steel shoes, well riveted to the frame of the vessel, and connected to the



inner bottom by angle-bars 4 x 4 inches of 10 pounds per

foot riveted through the reverse-bars.

At the water-tight bulkheads an angle-bar 3 x 3 inches of 7 pounds per foot will be substituted for the ordinary frame to connect the bulkheads to the outside plating. This bar is

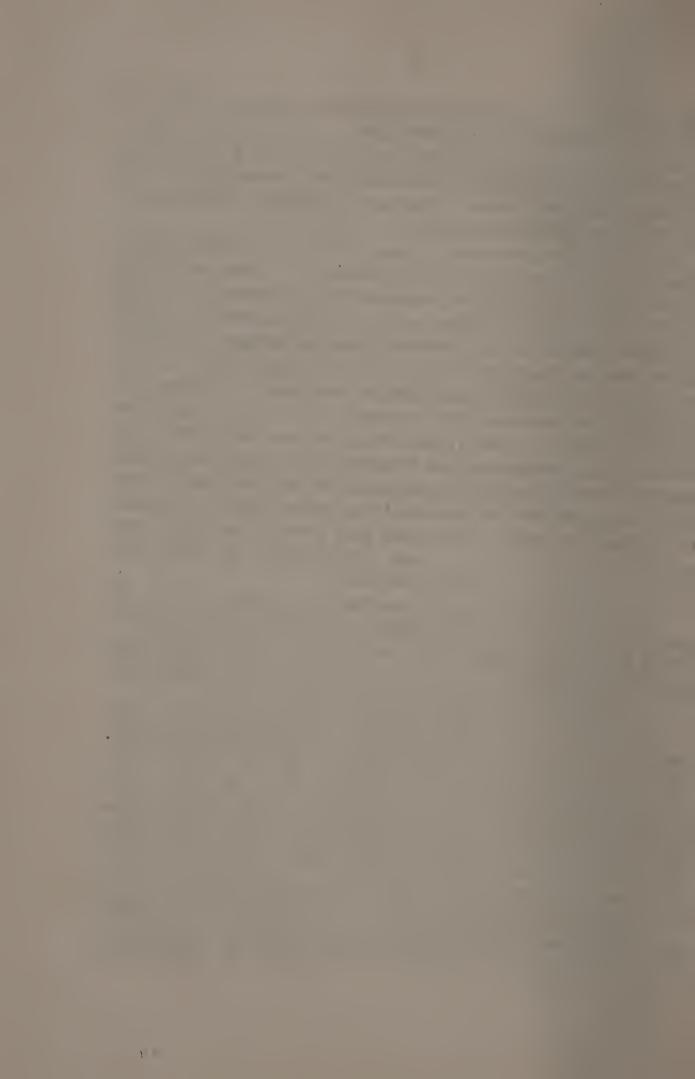
not to pierce the longitudinals.

Above the protective-deck from frame 31 to frame 74 inclusive, or limit of the double-bottom, also before and abaft these stations or limit, the frames will be formed of Z-bars $6 \times 3\frac{1}{2} \times 3$ inches of 14 pounds per foot, spaced as before described, and the frames generally will be worked as follows: A bracket or floor-plate 10 pounds per square foot is to be worked to form the lower part of the frame, the Z-bar will be split up at lower end and opened out, the lower part forming the ordinary outer frame angle-bar to butt against the vertical keel, the upper part forming the reverse-bar, and to extend about $2\frac{1}{2}$ feet past the middle line and butt on alternate sides, the butts to be covered by suitable straps; the plates to be well riveted to the outer and reverse-bars and connected to the vertical keel and longitudinals by angle-bars $2\frac{1}{2} \times 2\frac{1}{2}$ inches of 5 pounds per foot.

The frames above protective-deck to be connected to the same by means of bracket-plates and angle-bars, the plates to be 15 pounds per square foot, well riveted to the frames and lightened with holes, as shown on midship section; angle-bars

to be 4 x 4 inches of 10 pounds per foot.

Where the sides of the vessel are recessed above the gundeck forward and abaft the gun-sponsons nearest the extremities of the vessel, the frames will cut off at 7 inches above the gun-deck stringer-plate; above this plate the frames will be made of Z-bars, same dimensions and weight as the frames below, to be split at the lower end, and the outer part forming the ordinary outer angle-bar opened out to the required curve or shape, as shown on the cross-sections, the inner part forming the reverse-bar to continue down straight to the stringer-plate; between these bars a plate 10 pounds per square foot will be riveted, to be lightened with holes as indicated on



plans; angle-bars $2\frac{1}{2} \times 2\frac{1}{2}$ inches of 5 pounds per foot to be worked to connect these frames to gun-deck stringer-plate and beams.

Between the berth and gun-decks, on frames 22 and 58, belt-frames $12\frac{1}{2}$ pounds per square foot will be worked, to be connected to the outside plating by angle-bar 3 x 3 inches of 7 pounds per foot, stiffened on the inner edge by double angle-bars $2\frac{1}{2}$ x $2\frac{1}{2}$ inches of 5 pounds per foot, to be well riveted to the gun-deck beams and connected to the berth-deck plating by angle-bars $3\frac{1}{2}$ x 3 inches of 8 pounds per foot. To be worked in shape and size, also lightened with holes, as shown on the midship section.

All transverse frames to be continued up to the height indi-

cated on the profile and section plans.

Special framing to be worked at the intersection of the topside and gun-sponsons, also in wake of shaft-bearers and struts and other important parts requiring special strengthening.

At the extremities of the vessel the frames will be worked

as indicated on plans of stern-post and stem.

LONGITUDINALS.

To be formed as shown on the midship section, and to ex-

tend forward and aft as herein specified.

Within the Double Bottom: The 1st and 2d longitudinals from the keel to be formed of plates 15 pounds per square foot, the lower edge to be slotted over the continuous transverse frames, a continuous angle-bar to be fitted on the inner edge, and the horizontal flange of the angle-bar on the outer edge to be worked continuously under the continuous transverse frames, and the upper flange scored at the frames; these outer and inner angle-bars to be each 3 x 3 inches of 7 pounds per foot, the plates to be in depth amidships as follows:

First from the keel_____34 inches. Second from the keel _____28\frac{3}{4} "

The shape of the longitudinals to be as shown on the plans.

2. [2240]



In the fore and after parts of the double bottom the depth of 2d longitudinal is not to be less than 18 inches.

Intermediate longitudinal frames to be introduced in wake

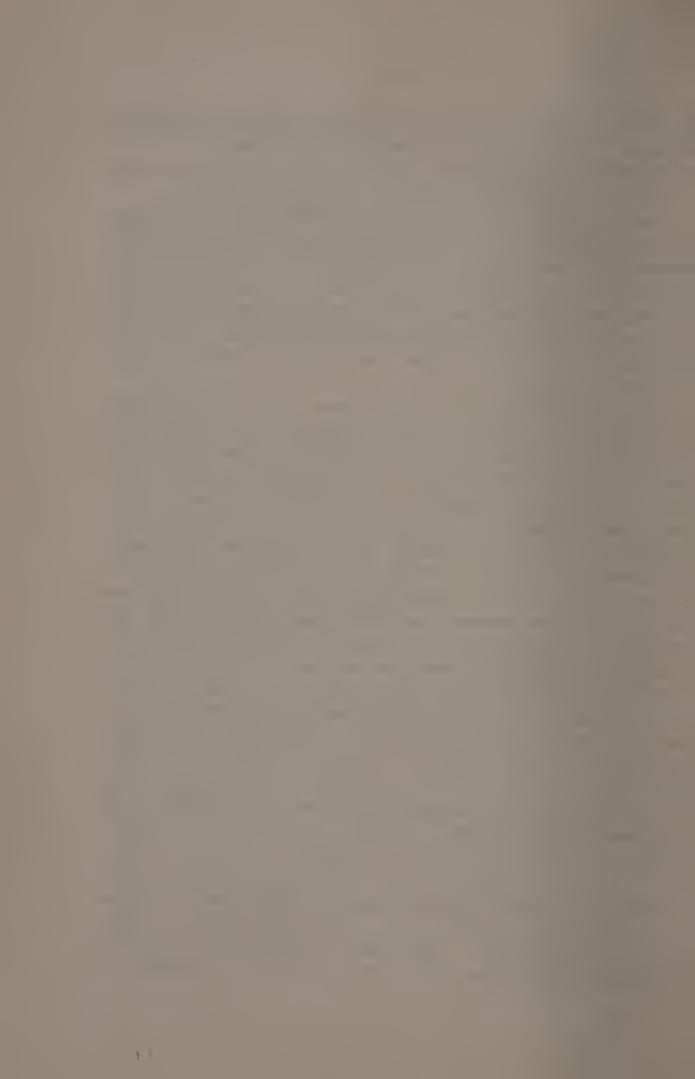
of the engines, boilers, and shaft-bearers, as required.

The butts of the plates of each longitudinal to be double chain-riveted, the straps to be single, and of the same thickness as the plates, and their length to be 11½ times the diameter of the rivets. The butts of the inner angle-bar to be midway between the lines of rivets in the frames, and not in the same space with the lightening-hole or the butt of the adjacent plates, the covering-angles to them in this case being

dispensed with.

Before and Abaft the Double Bottom: The 1st longitudinal from the keel on each side will be formed of intercostal plates 15 pounds per square foot, to extend from frame 14 to about frame 86, to be connected to the floor-plates by angle-bars $2\frac{1}{2} \times 2\frac{1}{2}$ inches of 5 pounds per foot, and on lower edge to the outside plating by 3 x 3 inches of 7 pounds per foot angle-bars between the frames; on upper edge to be connected by intercostal angles 3 x 3 inches of 7 pounds per foot to the inner bottom, the inner angles forward of frame 16 to be connected over the reverse-bars by lozenge-shaped straps $12\frac{1}{2}$ pounds per square foot, well riveted to angles and frame-bars.

The 2d longitudinal from the keel on each side to be constructed similarly to the 1st longitudinal, except that forward of frame 31 a Z-bar 5 x 3 x 2½ inches of 12 pounds per foot will be worked on the upper edge, well riveted to the plates, which will be made of sufficient depth to admit of this being done, also riveted to the reverse flanges of the frames; and, in order to preserve the continuity of longitudinal strength of the vessel, the fore-part of this 2d longitudinal will be gradually twisted so as to make good connection with the after-end of horizontal flat abaft of, and connecting with, ram-plate. Abaft the after-end of tapered plate of inner bottom at frame 75 there will be secured to the intercostal angles on upper edge of longitudinal a flat plate 12 inches wide and 12½ pounds per square foot, well riveted to the reverse-flanges of



the frames and to the tapered strake of inner bottom; the after-end of this longitudinal to be on about frame 80, or

further aft, if practicable.

The 3d longitudinal will extend from frame 29 to frame 76, and made of Z-bar $12 \times 3\frac{1}{2} \times 3$ inches of $22\frac{1}{2}$ pounds per foot, the inner flange to be continuous, and the bar to be carefully slotted down over the frames and fay against the bottom plating, to which it will be riveted; to have a continuous angle-bar 5×3 inches of 10 pounds per foot worked on upper side, well riveted to the Z-bar and reverse angles.

The 4th longitudinal will be similar in all respects to the

3d longitudinal, and to extend from the stem to frame 19.

All the Z-bars and angle-bars forming longitudinals to be worked in the longest lengths practicable, the butts to be properly shifted and suitably strapped and double-riveted; the plates to be generally worked in lengths of five frame spaces within the double bottom, or longer if necessary to give good shift of butts.

Within the double bottom the plates of the 1st and 2d longitudinals from the keel to be lighted with holes, which are to be arranged with a view to the freedom of access required within the compartments of the double bottom and with reference to the butts in the adjacent plating, taking care to preserve uniformity of strength in the several frame-spaces.

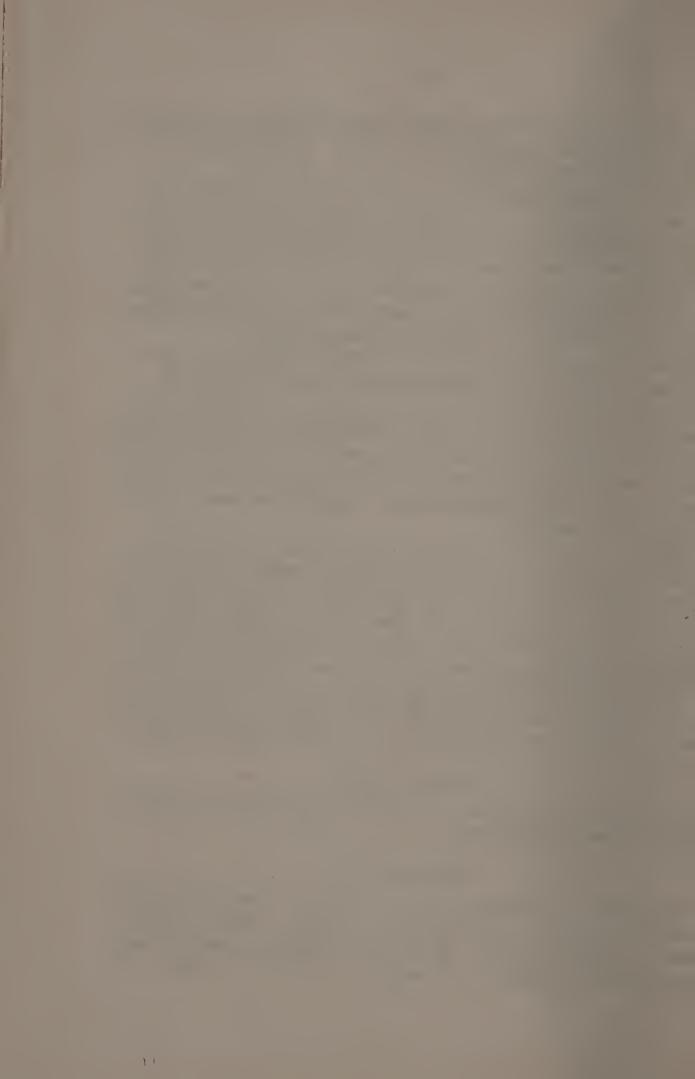
Openings are to be left in the upper edge of the 1st and 2d longitudinals from the keel where required in each compartment, to allow air to escape when filling the double bottom.

WATER-COURSES.

To be cut in longitudinals and transverse frames, and elsewhere as may be directed.

DECK-BEAMS.

Forecastle and Poop-deck Beams.—To be of angle-bulb pattern, 6 x 3 inches of 15 pounds per foot. There will be a beam on every frame, or as shown on the plans, each to have a spring of 6 inches in a length of 49 feet, the ends to be



turned down 18 inches, forming knees on the frames to which they will be riveted; the beams over the two forward guns will be well-kneed to the girder at the port-head. Under standard compass the poop-deck beams to be of brass as shown

on plans.

Gun-deck Beams.—To be of T-bulb pattern, 8 x 5 inches of 27 pounds per foot, to have a beam on every frame, each to have a spring of 6 inches in a length of 49 feet, the ends to be split and turned down with a piece welded in and lightened with holes, as shown on midship section; the knee to be in depth 24 inches and securely riveted to the frames. From 89 aft the beams will be reduced in weight to 23 pounds per foot.

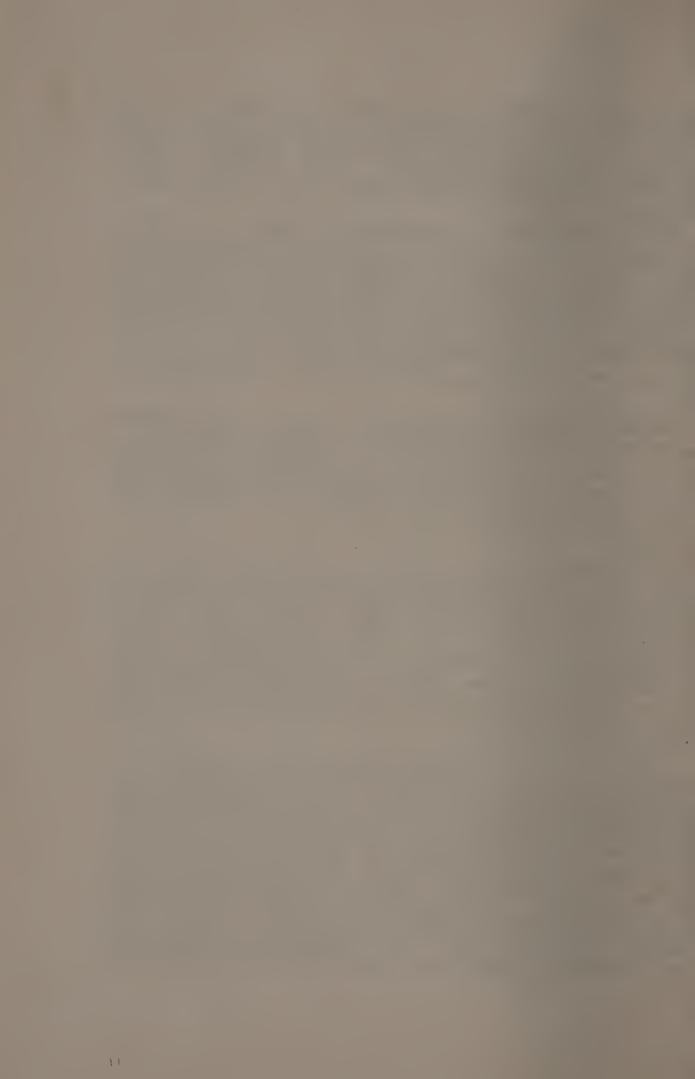
Berth-deck Beams.—To be of T-bulb pattern, 8 x 5 inches of 23 pounds per foot throughout the length of this deck; to have a beam on every frame; same spring as the other decks, the ends turned down, a piece welded in and lightened with holes and well riveted to the frames, same as the beams of

gun-deck.

Protective-deck Beams.—To be of angle-bulb pattern, from frame 29 to after-end of double-bottom to be $9 \times 3\frac{1}{2}$ inches of 22 pounds per foot, before and abaft these points to be $8 \times 3\frac{1}{2}$ inches of 20 pounds per foot. There will be a beam on every frame to be shaped agreeably with the slope shown on midship and other cross-sections; the ends to be connected to the frames of the vessel by well-riveted bracket-plates $12\frac{1}{2}$ pounds per

foot, as shown on plans.

Platform Beams.—To be of angle-bars 4½ x 3 inches of 9 pounds per foot, placed, except as hereafter mentioned, on every frame forward and abaft the engine and boiler space; to be worked straight and the ends connected to the frames by well-riveted bracket-plates 10 pounds per square foot; these beams will not pass through the fore-and-aft bulkheads between frames 17 and 31, forming the sides of ammunition rooms, but will cut off against them, and be connected to the vertical stiffening-angles of the bulkheads by well-riveted bracket-plates 10 pounds per square foot; outside the ammu-



nition rooms only about every other beam, or as shown on the plan, will be extended out to the frames of the vessel, to which they will be connected by bracket-plates, the inner ends connected in similar manner to the fore-and-aft bulk-

heads; all bracket-plates 10 pounds per square foot.

Under Magazines, Shell-Rooms, &c.—Abaft engine-room, the beams to be of angle-bar 4 x 3 inches of 8 pounds per foot, or heavier if required, worked straight, and on every frame, to which they will be well riveted; also supported in the center over the vertical keel-plate by angle-clips worked as stanchions, as shown on the plans.

BRIDGE-BEAMS.

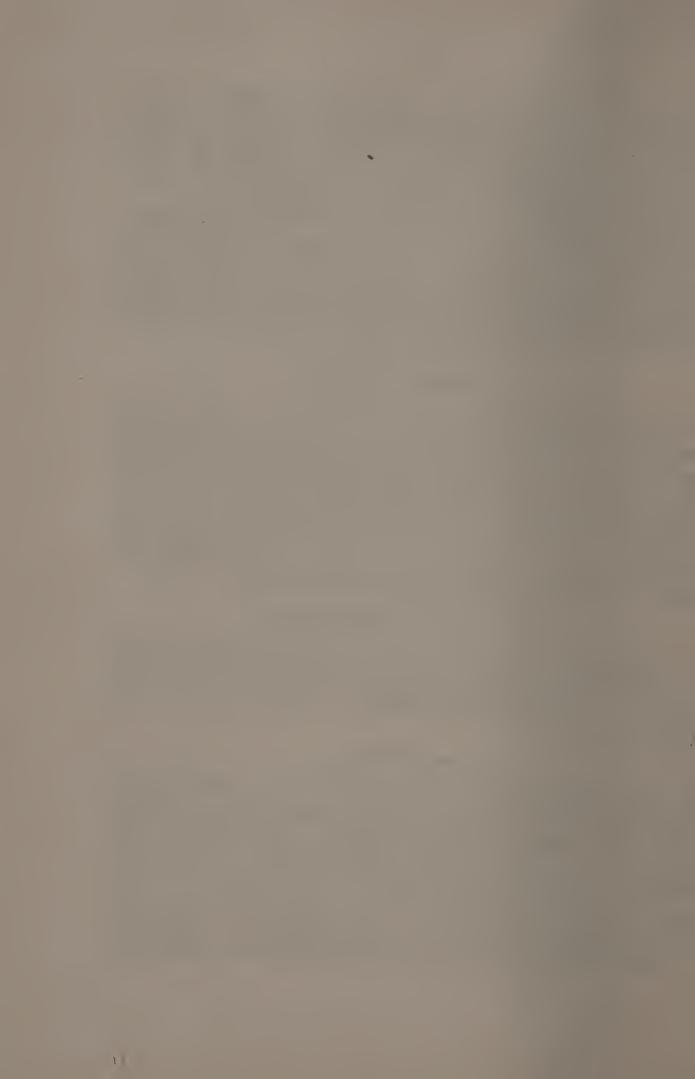
To be of angle-bulb pattern, $9 \times 3\frac{1}{2}$ inches of 22 pounds per foot; to be spaced as shown on the plans, each to have a spring of 6 inches in a length of 49 feet, the ends to be turned down forming knees, those over the gun-ports to be well kneed to the girder at the port-head, this girder to be formed of angle-bulb not less than the beams, additional beams and framing to be worked where required. All this work to be done in the most careful and appropriate manner.

HALF-BEAMS AND CARLINGS

On all decks to be of the same section as the beams where necessary, but elsewhere may be reduced in dimension, as directed. All to be well secured at the ends similar to the other beams.

SKID-BEAMS.

Two skid-beams, on which to stow the sailing-launch, steam, and other cutters, will be worked on each side the vessel just abaft the forward bridge; to be made of bulb-pattern, 9 x 5 inches of 21 pounds per foot, the outer ends strongly connected to the topside of the vessel, and the inner ends turned down to form knees against the sides of the chimney-hatch inclosure, to which they will be riveted, the vertical stiffeners being placed opposite these for this purpose;



also secured to tie-plates 12 inches wide of 10 pounds per square foot, worked on each side over the ends of the beams and extending to the bridge; to have 3 x 3 inches of 7 pounds per foot angle-bar on lower side connecting this tie-plate to the hatch-inclosure. Tie-rods as approved, to connect the sides of the hatch together at the top, will be placed as near as practicable opposite the beams.

All beams to be rolled in one length and of the weight per toot as herein specified. The beams at the ends of the boiler-hatches, and other similar places, may be of plates and angle-

bars instead of bulb-patterns, if desired.

OUTSIDE PLATING.

To be worked as shown on the midship-section and expansion plan, weight per square foot of the several strakes to be as follows: outside flat keel-plate, 20 pounds; inner flat keelplates and garboard strakes and bottom, to and including first strake above protective-deck, 17½ pounds; from the gun-deck to and including doubling-strakes, to be 15 pounds; above the gun-deck, between the midship gun-sponsons, to be 10 pounds; forward and abaft these and forming sides of poop and forecastle to be $12\frac{1}{2}$ pounds; the plates to be thickened up to 15 pounds per square foot where subject to the flash of the guns, and at the torpedo-ports for protection against machine-gun fire, as required. To be worked lap-jointed from the keel to the height of the protective-deck, and flush-jointed above this height. The lap-jointed plates to be double-riveted at the edges, the breadth of lap to be $5\frac{1}{2}$ times the diameter of the rivets; the flush-jointed plates to be single-riveted at the edges, the breadth of edge-strip to be 7 times the diameter of the rivets, the strips to be worked continuously, liners being fitted between them on the frames. All the plates to be doubleriveted at the butts, the breadth of straps to be 11½ times the diameter of the rivets; all plates ending on the stem and sternpost to be double-riveted.

The lengths of the plates to be as indicated on the expansion plan of plating; and the butts to be as nearly as possible

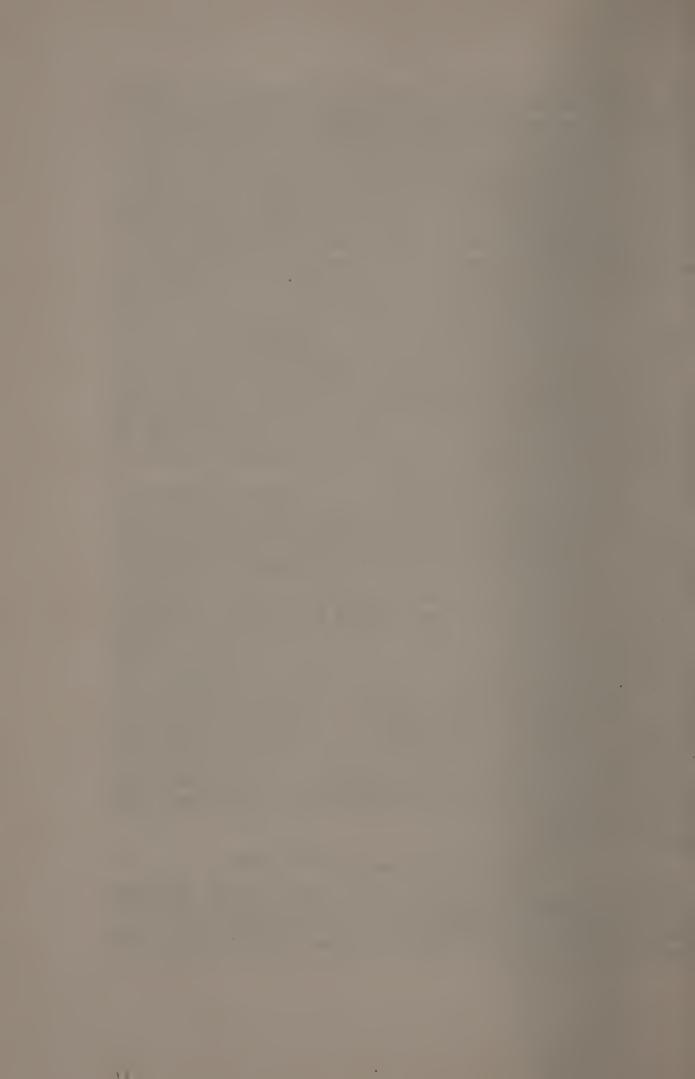
in the middle of the openings between the frames, and there is to be in all cases not less than two plates between butts vertically over each other. All the butt-straps and edge-strips to be of the same quality and thickness as the plates they connect and to have the fiber in the same direction as that of the plates. The butt-straps to the inside strakes of bottom to be of the whole breadth of the plates, those to the outside strakes to extend only between the edges of the adjacent inside strakes. An additional sheer-strake will be worked on the inside as shown on the cross-section, extending from 18 inches abaft frame 21 to 18 inches abaft frame 83. A doubling-strake will be worked on the inside at the water-line to extend from about frame 28 to frame 77; this strake will have its upper and lower edges parallel with the water-line; doubling-strakes will also be worked in wake of the chafe of the anchors and to strengthen the ram-bow; double-riveted straps to be fitted to both thicknesses of plating.

Solid liners of the same thickness as the adjacent plates are to be fitted between the frames and the outside strakes of the plating. The liners at the water-tight transverse bulkheads to extend on each side of the frame-angles sufficient to take two additional rows of rivets on each side, the rows not to be in line with the rivets in the edge-fastenings of the plating. All laps, butt-straps, and faying surfaces of the plates to be cleaned from rust before being worked. The edges and butts to be planed and accurately fitted, and all joints to be calked in the most careful manner, metal to metal; no canvas, red lead, or any other substance, on any account, to be inserted in the seams. The whole surface of the bottom plating to be thoroughly cleaned of the scale formed in manufacture by immersing each plate in a bath of dilute hydrochloric acid, or by some other

approved method.

GUTTER OR FLAT KEELSON-PLATE.

To be 15 pounds per square foot, and in width 46 inches for the length of the double bottom; from double bottom forward it will be tapered down in three frame spaces to 24



inches wide and extend for that width to frame 17, from which point to be tapered down in one frame space to the width of the double angles on upper edge of vertical keel; the after

end to similarly taper down in two frame spaces.

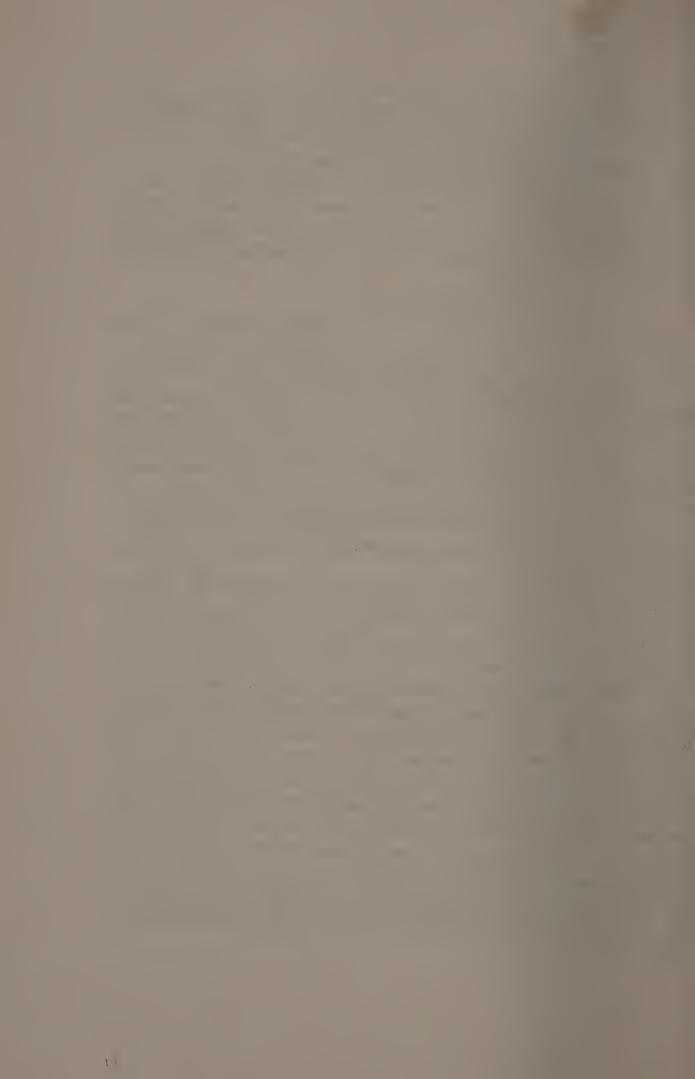
To be worked in lengths of about 15 feet or longer if necessary, to make good shift with the butts of the vertical keel; the butt-straps to be double-chain riveted and worked on the upper side, and their length to be $11\frac{1}{2}$ times the diameter of the rivets.

INNER BOTTOM.

To be worked as shown on the midship section, and in lengths of about 15 feet, and to extend from frame 31 to frame 74, inclusive. To be formed of plating $12\frac{1}{2}$ pounds per square foot, except the upper bounding strake on each side forming coaling flats, which will be each 15 pounds per square foot. The fore ends of the plates on top of the second longitudinal on each side to be tapered down in one frame space to the width of the bars on upper edge of longitudinal; the after ends will taper down in similar manner to the width of flat plate on top of second longitudinal, to which it will be suitably connected.

Between frames 31 and 17, inclusive, forming the bottom of ammunition rooms, the plating will be worked as a continuation of the inner bottom and made of 10-pound plating, except the strake on top of the first longitudinal on each side, which will be $12\frac{1}{2}$ pounds per square foot, and the fore ends to be tapered down in one frame space to the width of bars on upper edge of longitudinal; abaft frame 74 the plating forming bottom of ammunition rooms to be made of 10 and $12\frac{1}{2}$ pounds per square foot plating, as shown on the plans.

All this plating to be worked lap-jointed, with liners fitted between the frame-bars and the raised strakes of plating; the edges to be single-riveted, except those to the gutter or flat keelson-plate, which will be double-riveted; the butts to be double-chain riveted throughout, the straps to be worked on upper side and their length to be $11\frac{1}{2}$ times the diameter of the rivets.



The water-tightness of the inner bottom will be completed at the sides by means of cast-steel shoes $3\frac{1}{2} \times 3\frac{1}{2}$ inches of 9 pounds per foot, worked around the main frames of the vessel, and well riveted to the inner and outer bottom plating, as shown on midship section. If found necessary to sink at certain places any portion of the machinery below the inner bottom, the water-tightness of same must be preserved by forming pockets, only, however, for the space really required.

In the engine spaces the inner bottom shall be made heavier where required, for securing the engine keelson or other

purposes.

Two man-holes, with raised water-tight covers, to be fitted on the inner bottom in convenient positions to give access and ventilation to each compartment within the double bottom; size of man-holes in the clear 15 x 23 inches.

All this work to be carefully calked and made thoroughly

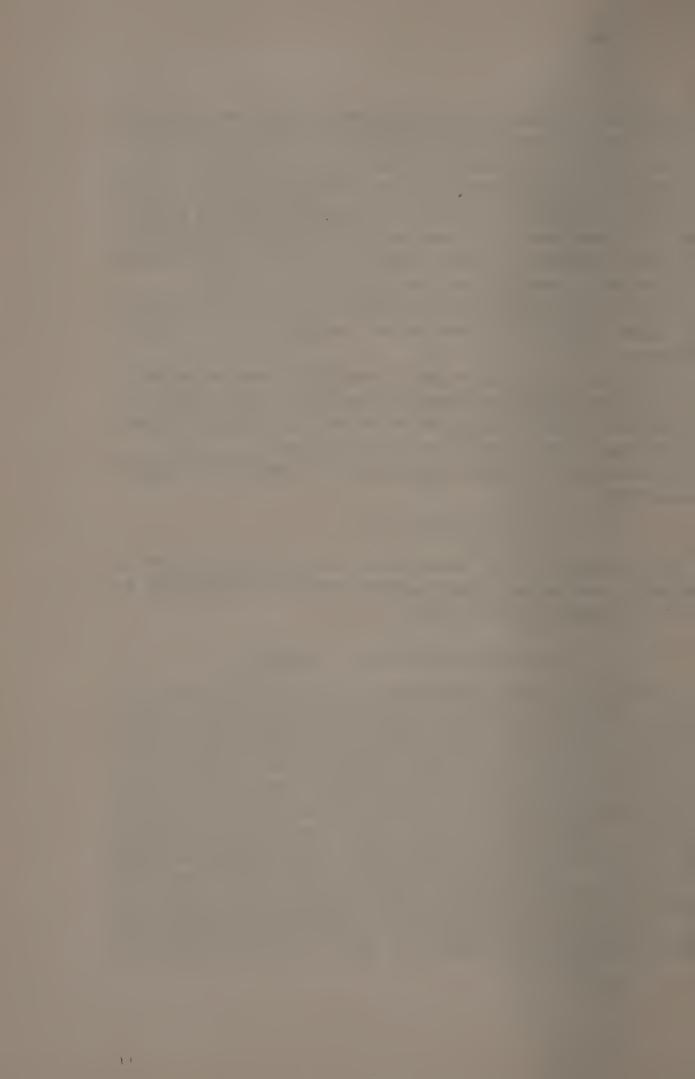
water-tight.

BREAST-HOOKS.

The arrangement of breast-hooks, &c., for the support of the stem, and at such other places as may be necessary, are to be in accordance with the plans.

DECK-STRINGERS AND PLATING.

To Poop and Forecastle-decks.—To be 24 inches wide by $12\frac{1}{2}$ pounds per square foot, worked on the ends of the beams, the butt-straps to be on lower side and double-riveted; at the ends of the vessel to be filled in between the stringers with 10 pounds plating; to be connected on the topside to the outside plating by a continuous angle-bar $3\frac{1}{2}$ x 3 inches of 8 pounds per foot. Over the raised after-end of forecastle and fore-end of poop-deck, to be plated at the sides, over the guns, as shown on the plans, with plating $12\frac{1}{2}$ pounds per square foot, to be flush-jointed, with single-riveted edge-strips on upper side, the butt-straps to be worked on lower side and double-riveted. The bounding angles worked on upper side connecting same



to outside plating, &c., to be $3\frac{1}{2} \times 3$ inches of 8 pounds per foot; plating in wake of capstan, bitts, and compressors to be $12\frac{1}{2}$ pounds per square foot, and 8 pounds plating around hatches

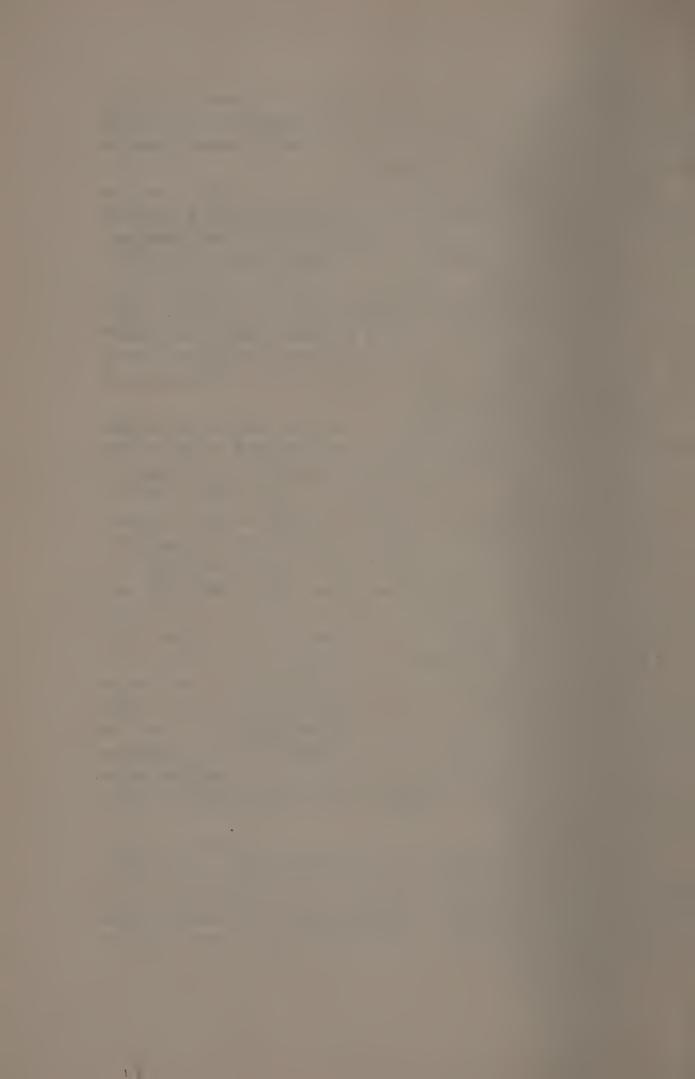
and at edges of decks, as required.

Plating on Bridges.—To be plated at the sides over the guns, as shown on the plans, with $12\frac{1}{2}$ pounds plating strapped on lower side, and connected on upper side to outside plating, &c., by bounding angle-bars $3\frac{1}{2} \times 3$ inches of 8 pounds per foot; the plating under the conning tower will be 15 pounds per square foot. Splinter-proof plating $12\frac{1}{2}$ pounds per square foot will also be worked over that portion of the beams under the stowage of boats just abaft the forward bridge, as shown on the plans. Eight pounds plating to be worked at the

edges of bridges, as required.

To Gun-deck.—The stringer to be 20 pounds per square foot, in width amidships 60 inches, and tapered at the ends to 42 inches wide; abaft the after gun-sponsons the plates will be reduced in weight to 15 pounds per square foot; forward of the forward sponsons or inclosed forecastle these stringers, and also the other plating under the cable-bitts, nippers, &c., will all be 15 pounds per square foot. These plates will not cut off against the bulkheads near after-end of forecastle and near fore-end of poop-deck, but will pierce them; to be worked flush-jointed with single-riveted edge-strips on upper side; the butts to be single-strapped and treble-chain riveted, with some of the rivets omitted, to be double-riveted at the ends of the vessel; the straps to be on lower side, and all to make good shift with the butts of the outside plating; to be connected on the upper side to the sheer-strake by a continuous angle-bar 4 x 3 inches of 8 pounds per foot; where the transverse frames extend up through this stringer-plate the angle will be intercostal.

Plating 8 pounds per square foot to be worked over the midship portion of this deck, as shown on the plan, to be flushjointed, single-riveted at the edges, and double-riveted at the butts; the edge-strips to be on the upper side and the butt-straps on the lower. Plating in wake of mast-partners and windlass



to be 15 pounds per square foot, and around the hatches to be plated with 10 pounds plating, except amidships, where the 8 pounds plating is worked across the deck. A tie-plate 12 inches of 10 pounds per foot to be worked on each side of the after hatches, as shown on the plans, well fastened to the beams and other plating of this deck, the butts double-chain riveted with

straps on lower side.

To Berth-deck.—Stringers to be worked on the ends of the beams and made of plating 10 pounds per square foot, worked in two widths amidships over the side coal-bunkers, each strake about $4\frac{1}{2}$ feet wide, the outer strake on each side to be tapered to a width of 28 inches at the fore and after ends, to be connected on the upper side to the outside plating by intercostal angle-bars 3×3 inches of 7 pounds per foot, and to the reverse flanges of the frames by a continuous angle-bar 4×3 inches of 8 pounds per foot. These plates to be worked flush-jointed, with single-riveted edge-strips on upper side, the butts to be single-strapped and treble chain-riveted, with some of the rivets omitted, the straps to be on lower side, the plates to be worked in lengths of about 15 feet, and all to make good shift with the butts of the outside plating.

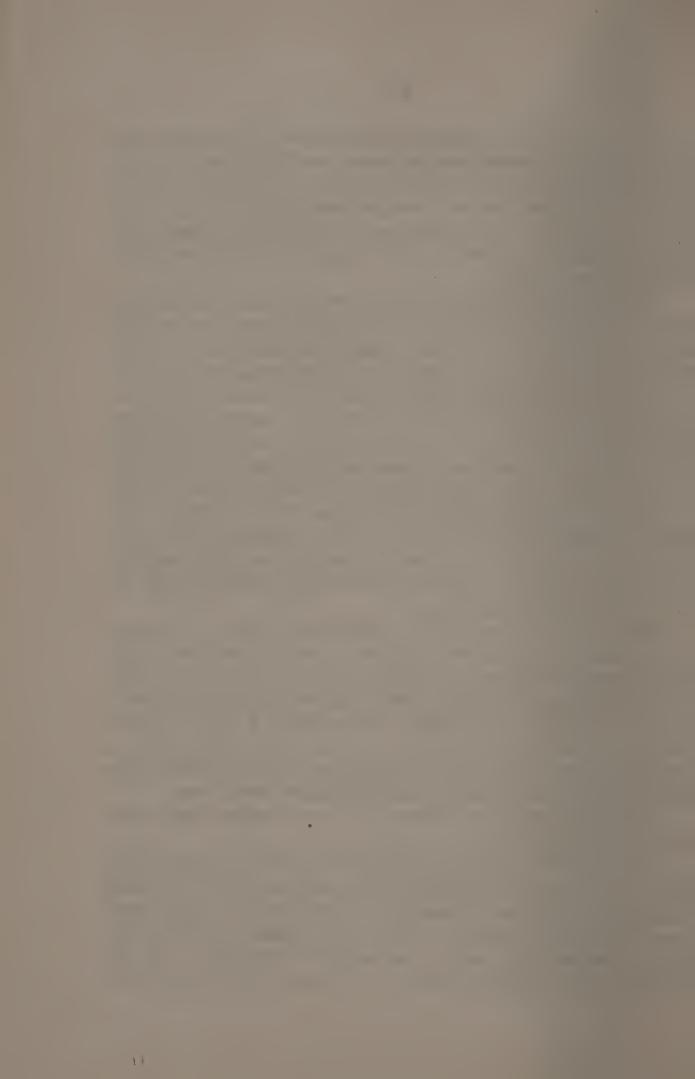
Before frame 34 and abaft frame 74 to be filled in between the stringers; also between the stringers and tie-plates amidships over the coal-bunkers, with plating 5 pounds per square foot, the edges to be lapped and single-riveted, with doubleriveted straps on lower side. A tie-plate 12 inches wide in narrowest part of 15 pounds per square foot will extend on each side of the engine and boiler-hatch, well connected to the

deck-plating with double-riveted straps on lower side.

All the plating of this deck to be well calked and made

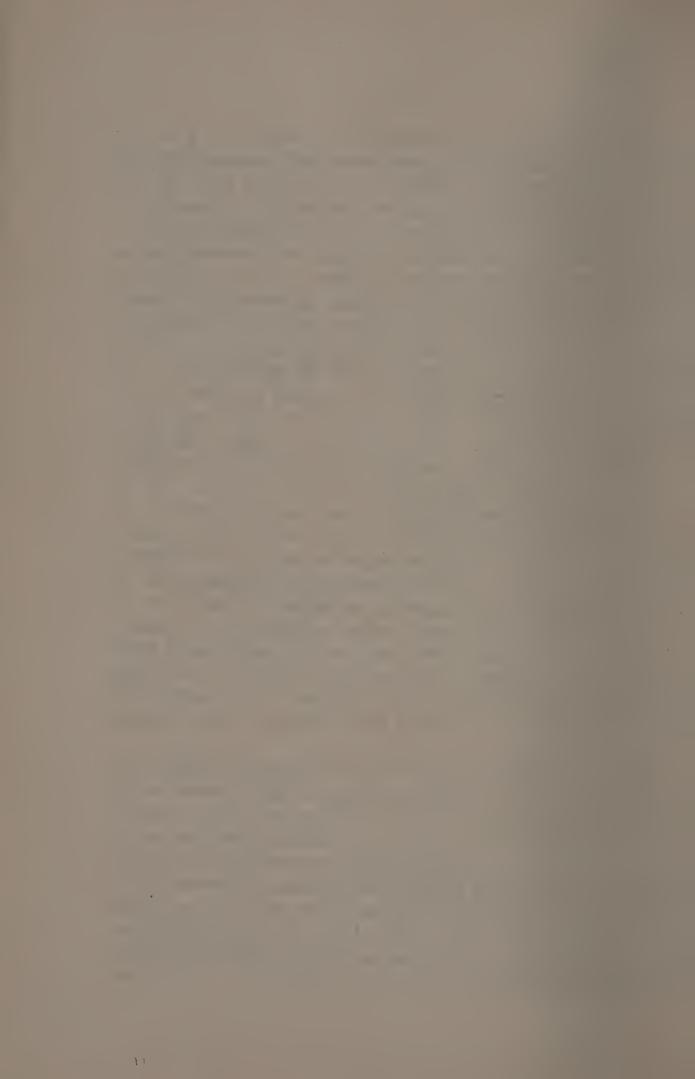
water-tight.

Protective-Deck.—There will be first worked on top of the beams for the whole length of the vessel a course of plating 20 pounds per square foot, flush-jointed, with single-riveted seam and butt-straps on lower side, worked between the beams, calked and made thoroughly water-tight. On the inclined sides a single thickness of armor-plate 100 pounds



per square foot will be worked, to be secured in place by means of 14-inch diameter tap-bolts carefully screwed through the 20-pound course of plating from the lower side, but not to enter the armor-plates to a greater depth than 1\frac{1}{4} inches; the bolts to be disposed on the plates as may be directed and accurately laid off, the holes tapped through the 20-pound plates before the armor-plates are put in place. On the horizontal part a single thickness of armor-plate 60 pounds per square foot will be worked, to be made 80 pounds over steering-gear and secured to the 20 pounds plating by tap-bolts $1\frac{1}{8}$ inches diameter screwed from lower side of the 20-pound plate. The plates to be all shaped, butted, and worked as shown on the plans, and the whole of this work to be calked and made thoroughly water-tight. The angle-bar on upper side to be 4 x 3 inches of 8 pounds per foot, well riveted to the plating and tap-bolted to the armor-plates, the bar on lower side to be well riveted to outside plating and to the lower or 20 pounds plating of the protective deck, with flush countersunk heads on upper side, this angle-bar to be 5 x 3 inches of 10 pounds per foot. Armor-shutters same thickness as the armor, also armor-bars or gratings of approved dimensions, to be fitted to all the hatchways or other openings in the protective plating, the shutters and bars to be hinged and fitted to secure open or closed. Water-tight scuttles for trimming the coal through into the lower bunkers, of the same thickness as the plating, to be fitted where shown on the drawings or where directed.

Water-tight Platforms before and abaft double bottom.—At the bow there will be a 20-pound plate at the after-end of the horizontal ram-plate, to which it will be connected by a double-riveted butt-strap on upper side; this 20 pounds per square foot plate will be connected by double-riveted butt-strap to 10 pounds per square foot plating, this plating will extend aft to frame 17, as shown on the plans, to be worked lap-jointed, single-riveted at the edges with double-riveted straps on lower side. On the ends of the beams, stringer-plates 10 pounds per square foot by about 26 inches wide will be worked and



fitted out to the outside plating, to which they will be connected by angle-bars $2\frac{1}{2} \times 2\frac{1}{2}$ inches of 5 pounds per foot between the frames; fore-and-aft angle-bars 3×3 inches of 7 pounds per foot will also be worked on the upper side to connect it with the reverse flanges of the frames. At the after ends, on each side for the length of about two frame spaces, the stringer-plates will be curved down as shown on the plans, the beam ends being bent for that purpose sufficient to allow the 2d longitudinal to be worked into and well scarfed to this flat. The butts of springer-plates to have double-riveted straps on lower side.

Between frames 17 and 31 the platform plating will be 8 pounds per square foot worked lap-jointed, single-riveted at the edges, with double-riveted straps on lower side; to be connected on the upper side to the vertical bulkheads all around by $2\frac{1}{2} \times 2\frac{1}{2}$ inches of 5 pounds per foot angle-

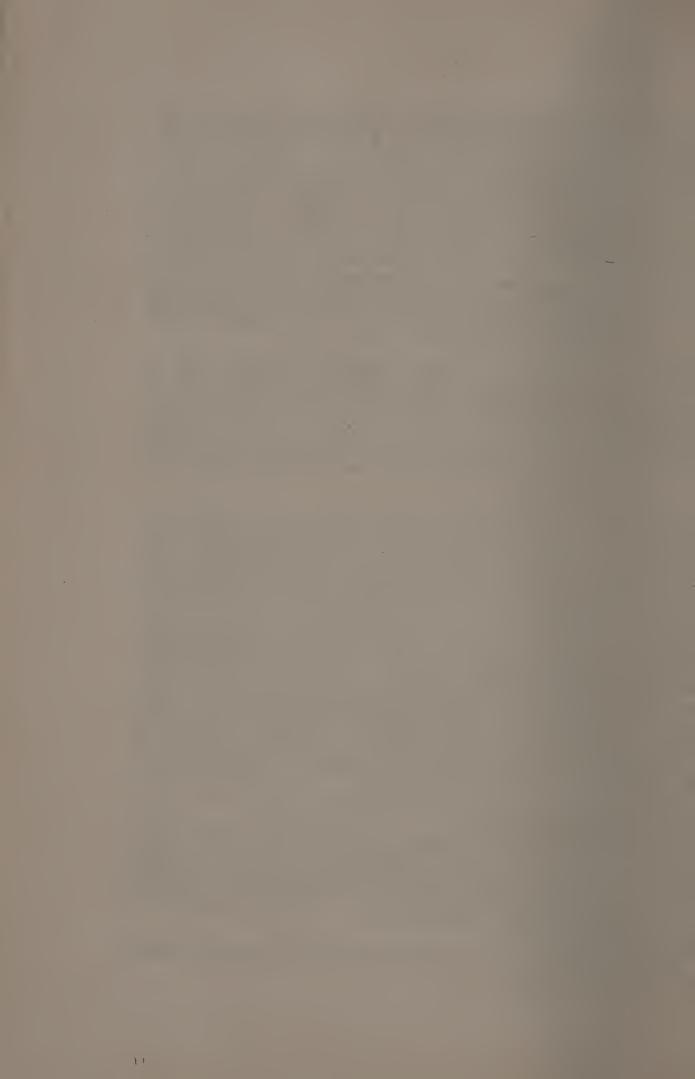
bars.

From frames 74 to 92, inclusive, a stringer-plate 30 inches wide by 10 pounds per square foot will be worked on each side and fitted to the outside plating, to which it will be connected by $2\frac{1}{2} \times 2\frac{1}{2}$ inches of 5 pounds per foot angle-bars between the frames; fore-and-aft angle-bars 3 x 3 inches of 7 pounds per foot will also be worked on upper side to connect them to the reverse flanges of the frames; to be filled in between the stringers with plating 8 pounds per square foot from frame 74 to 87, inclusive; all abaft frame 87 to be 10 pounds per square foot, and abaft 92 the plating will be similarly connected to the bottom plating and reverse flanges of the frames; all the plating to be worked lap-jointed and single-riveted at the edges, and double-riveted at the butts with straps on lower side.

A trough will be built in the after platform for the accommodation of steering-wheel shaft, &c., to extend from 86 to 92, and of the dimensions shown on cross-section, to be made of 5 pounds plating, and angle-bars $2\frac{1}{2} \times 2\frac{1}{2}$ inches of 5

pounds per foot.

All the platforms to be well calked and made water-tight;



water-tight scuttles and man-holes to be made and fitted wher-

over required.

Under Magazines, Shell and other Ammunition Rooms, forward and abaft the machinery space to be worked as an extension of inner bottom, fastened in similar manner, and made of plating 10 pounds per square foot, as shown on the plans.

TRANSVERSE WATER-TIGHT BULKHEADS.

To be located where shown on the plans; to be connected to the inner bottom and to the outside plating by a single angle-bar 3 x 3 inches of 7 pounds per foot; the two bottom strakes of all these bulkheads below protective-deck to be 10 pounds per square foot, the remaining strakes, including the upper strakes above the protective-deck, between outside plating and fore-and-aft coal-bunker bulkheads on each side, to be 8 pounds per square foot.

The plates for stuffing-box bulkhead to be $12\frac{1}{2}$ pounds

throughout.

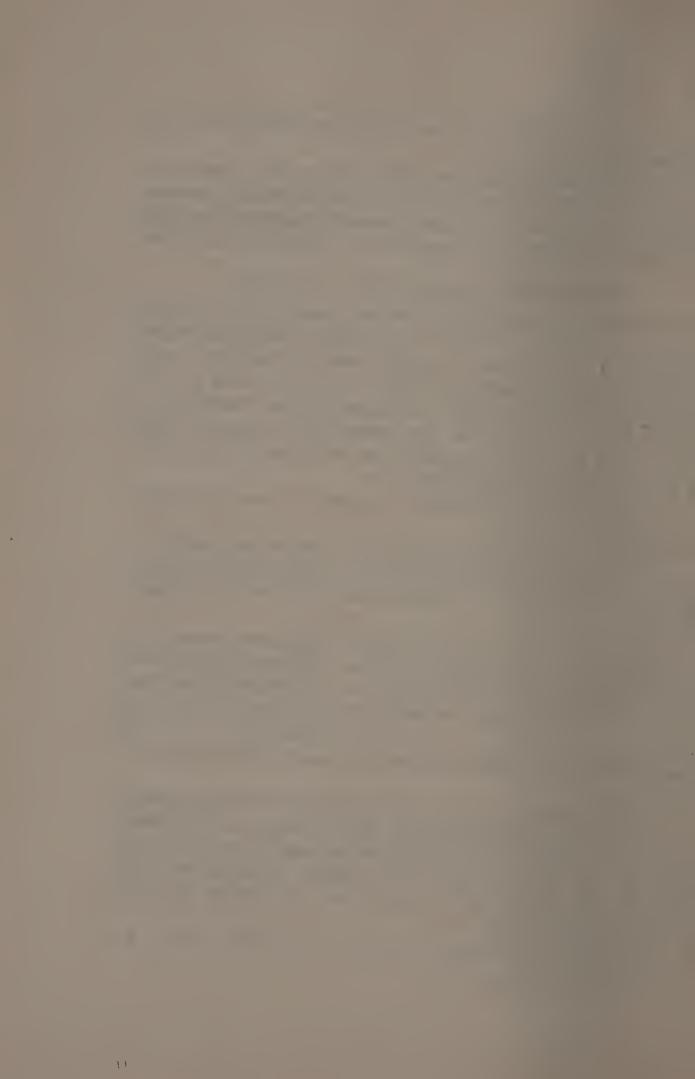
The plates of the bulkheads at the ends of the double bottom to be fitted round the gutter-plates, and such inner bottom-plates, &c., as may be extended forward and aft of the double bottom.

The inner bottom will be worked continuous through the bulkheads, the water-tightness of the bulkheads being maintained between the two bottoms by a solid water-tight frame; where there is no inner bottom the bulkheads will be bounded by the outside plating. The partial bulkheads in the wing coal-bunkers and other places to be located where shown on the plans.

All the plates to be worked flush-jointed and single-riveted, with horizontal **T**-bar stiffeners $4\frac{1}{2} \times 3$ inches of $8\frac{1}{2}$ pounds per foot, worked to take the place of edge-strips to the plating; and on the opposite side to be stiffened vertically by anglebars $3\frac{1}{2} \times 2\frac{1}{2}$ inches of 8 pounds per foot, placed not more

than 30 inches apart.

Angle-bars for taking the decks, flats, &c., to be 3 x 3 inches of 7 pounds per foot.



The parts of the transverse bulkheads above the protective-deck are to be cut off against the fore-and-aft coal-bunker and other fore-and-aft bulkheads to allow these latter bulkheads to be worked continuously from end to end above the protective-deck; all athwart-ship bulkheads above the protective-deck, other than the main transverse-bulkheads, on the midship part between the fore-and-aft and coal-bunker bulkheads to be $7\frac{1}{2}$ pounds per square foot, the bounding angles to be 3 x 3 inches of 7 pounds per foot; to be stiffened vertically by angle-bars 3 x 2 inches of 4 pounds per foot, placed about 30 inches apart; and where the depth is sufficient to require two strakes of plating, to be worked flush-jointed and single-riveted with horizontal seam-straps same thickness as the plates, worked on opposite side to vertical stiffeners.

Below the protective-deck the transverse bulkheads are to pierce the wing bulkheads and connect to them by angle-

bars 3 x 3 inches of 7 pounds per foot.

Additional stiffeners to be fitted to any of the bulkheads where required or directed. The whole of this work, both above and below the protective-deck, to be carefully calked

and made thoroughly water-tight.

The curved athwart-ship bulkheads under poop and fore-castle decks to be 8 pounds per square foot, to be plated vertically, butted at the edges with edge-strips on the outside, and single-riveted and stiffened by 3 x 3 inches of 7 pounds per foot vertical angle-bars on the inside. Bounding angles to be 3 x 3 inches of 7 pounds per foot.

COAL-BUNKER AND OTHER FORE-AND-AFT BULKHEADS.

Below the Protective-Deck.—The two bottom strakes of plates on each side to be 10 pounds per square foot, the remaining strakes up to under side of protective-deck to be 8 pounds per square foot, the plates to be lap-jointed, single-riveted at the edges and butts, worked in lengths generally 15 feet long, the butts properly shifted, to be stiffened vertically by angle-bars $3\frac{1}{2} \times 3$ inches of 8 pounds per foot, spaced not

more than 30 inches apart; all bounding angle-bars and bars connecting these bulkheads with the protective-deck and

inner bottom to be 3 x 3 inches of 7 pounds per foot.

Above the Protective-Deck.—To be worked continuously from end to end, and made of plates 10 pounds per square foot for the length occupied as coal-bunkers, forward and abaft to be of plating $7\frac{1}{2}$ pounds per square foot, the plates to be worked generally in lengths of 15 feet, the butts to be well shifted and double-chain riveted; to be stiffened vertically by angle-bars 3×2 inches of 4 pounds per foot, spaced about 30 inches apart; to be connected to the protective-deck by angle-bars 3×3 inches of 7 pounds per foot, and to the berth-deck by angle-bars $3 \times 2\frac{1}{2}$ inches of 6 pounds per foot. Additional stiffeners to be fitted to these bulkheads where required.

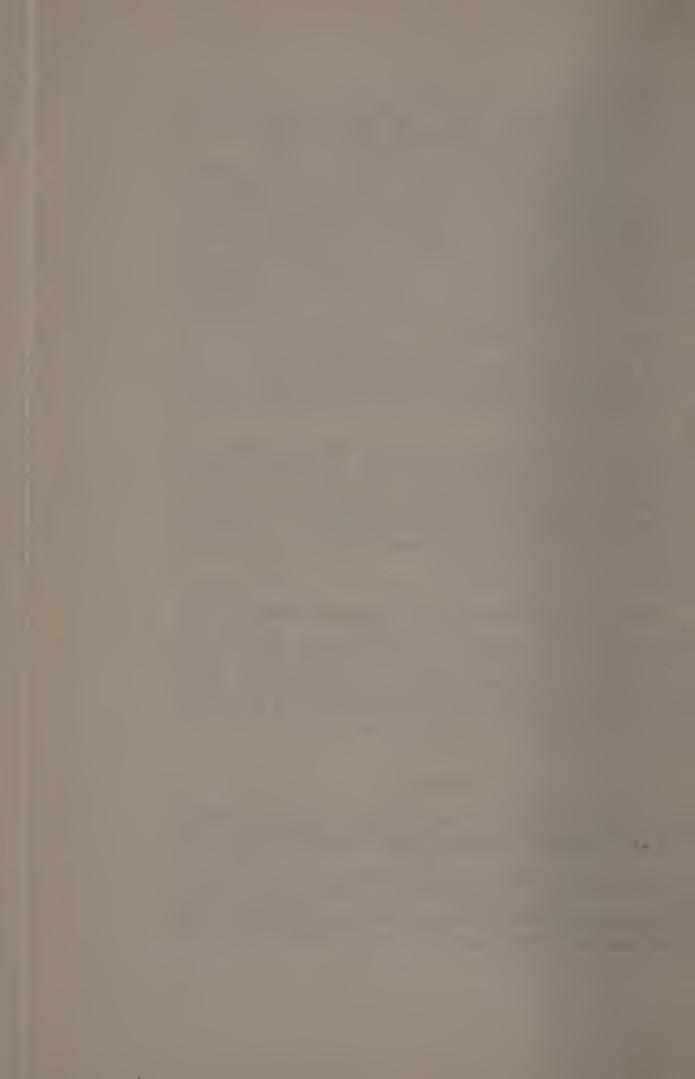
All of these bulkheads, both above as well as below the protective-deck, to be carefully calked and made water-tight. The bulkheads to be stayed wherever necessary, and shoveling-flats of wood or steel to be fitted as required. Overhead railways to be constructed in coal-bunkers with all necessary

fittings for proper transport of coal.

Battens of yellow pine 3 inches thick to be fitted where required under the coaling-scuttles, to prevent damage from the falling coal. Water-tight, coal-trimming doors to be fitted in the water-tight bulkheads within the bunkers above the protective-deck; other water-tight openings to be cut in the partial bulkheads, as shown on the plans, to allow the coal to be worked along the deck from end to end.

WING-PASSAGE.

A wing-passage will be built on the port side to furnish a protected communication between the two ends of the vessel and to admit the passage of torpedoes, also to serve as a communication between the engines and boiler-rooms; water-tight doors and air-locks will be provided and fitted for this purpose, as shown on the plans or as may be directed. The



bottom to be formed of plates 10 pounds and the side of 8 pounds per square foot, the bounding angles on inside to be $3 \times 2\frac{1}{2}$ inches of 6 pounds per foot, and the stiffening angles on outside to be 3×3 inches of 7 pounds per foot, placed opposite every stiffener on the bulkhead, to which they will be connected by 10 pounds per square foot bracket-plates; this passage to be in size as shown on the plans, to be well calked and made thoroughly water-tight throughout its whole length.

SHAFT ALLEYS.

The fore-and-aft bulkheads on each side to be of plate 10 pounds per square foot, single-riveted and stiffened as required for the magazines. To be completed with walking flat or bottoms of 10 pounds plate supported by $2\frac{1}{2} \times 2\frac{1}{2}$ inches of 5 pounds angle-bars on lower side. Water-tight man-holes to be fitted in the alleys for giving access to the bilges, &c., where required; also metal valves for draining water into the bilge; and hinged water-tight doors will be fitted at or near the fore ends of the alleys as required. The whole to be carefully calked and made water-tight.

ENGINE, BOILER AND SHAFT-BEARERS.

To be of steel, and made as light as consistent with the strength required, and in accordance with the requirements of the engineers. Access to be secured to all parts of the vessel under engines, boilers, &c., for cleaning and painting.

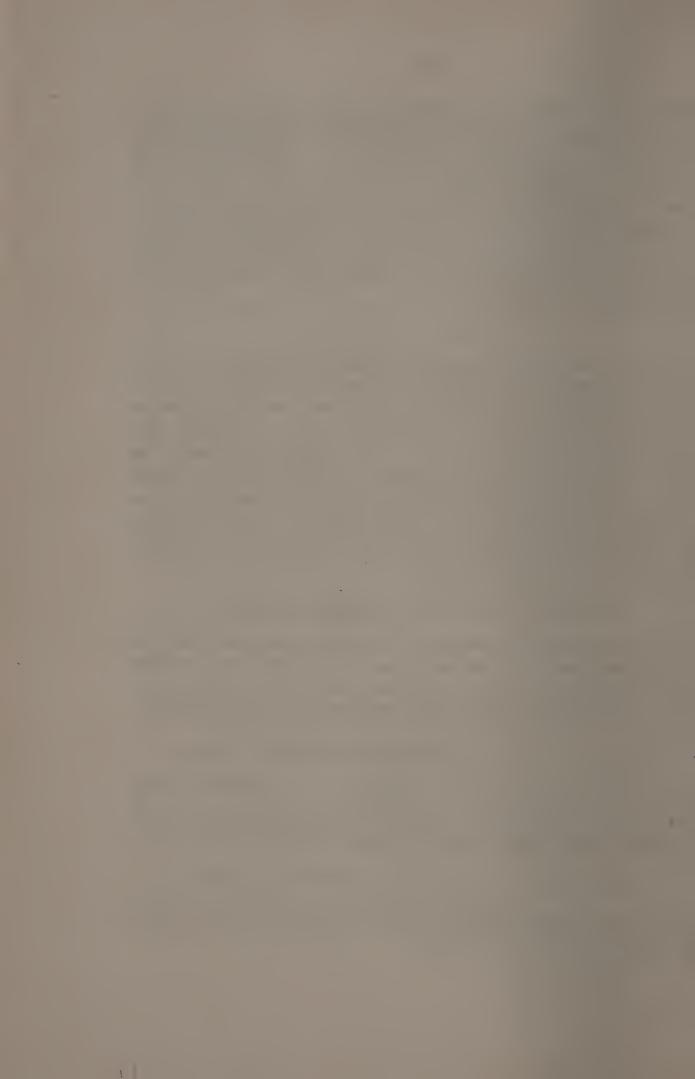
HOLES IN BULKHEADS FOR ENGINEERS' PIPES.

All holes in water-tight bulkheads, decks, platforms and elsewhere, for the passage of steam or other pipes, to be cut, and made water-tight round the pipes where directed.

STANCHIONS IN HOLD AND BETWEEN DECKS.

To be steel tubes, with the heads and heels welded in solid and firmly secured to the beams.

4. [2240]



Every beam where required to be stanchioned, trussed, or otherwise supported. The diameter or thickness of the stanchions to be as follows:

In hold, $4\frac{1}{2}$ inches diameter, $\frac{3}{8}$ inch thick.

On platforms, 4 inches diameter, $\frac{5}{16}$ inch thick. On berth-deck, 4 inches diameter, $\frac{5}{16}$ inch thick. On gun-deck, 3 inches diameter, $\frac{5}{16}$ inch thick.

Solid or tubular stanchions are to be fitted, as may be directed, in the engine and boiler-rooms, or elsewhere as required.

WATER-TIGHT DOORS, SLUICE-VALVES, ETC.

To be fitted in the bulkheads above and below the water-tight deck where shown on the drawings and as required; the plates of the doors to be of the same weight per square foot as the bulkheads of which they form part, and great care will be taken to have the door-frames as light as consistent with the strength required. Screens to be fitted around these doors where necessary. The more important doors, or as indicated on the plans, to be fitted to open or shut from the berth-deck, also from the hold or platforms on which they are situated. Where practicable, to be also fitted to be opened and closed from either side of the bulkhead.

Water-tight scuttles are to be fitted where shown on the

plan or as required.

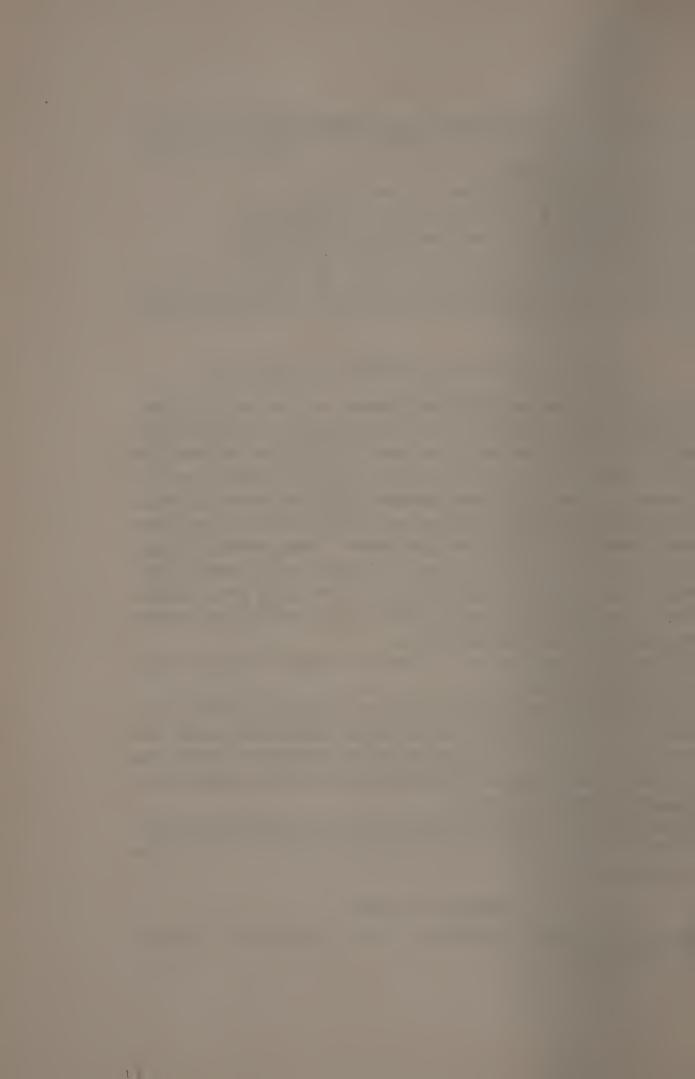
Socket-levers are to be fitted for opening and shutting the water-tight doors, and are to be stowed near their work; the plates on the deck for indicating the position of the doors to be marked with large sunken letters in a legible manner; the levers to be interchangeable.

Man-holes 15 x 23 inches are to be cut where required and fitted with water-tight covers, for giving access to the various

compartments.

SOUNDING-TUBES.

A sounding-tube to be fitted to each water-tight compartment or space.



TRUNKS TO COAL-BUNKERS.

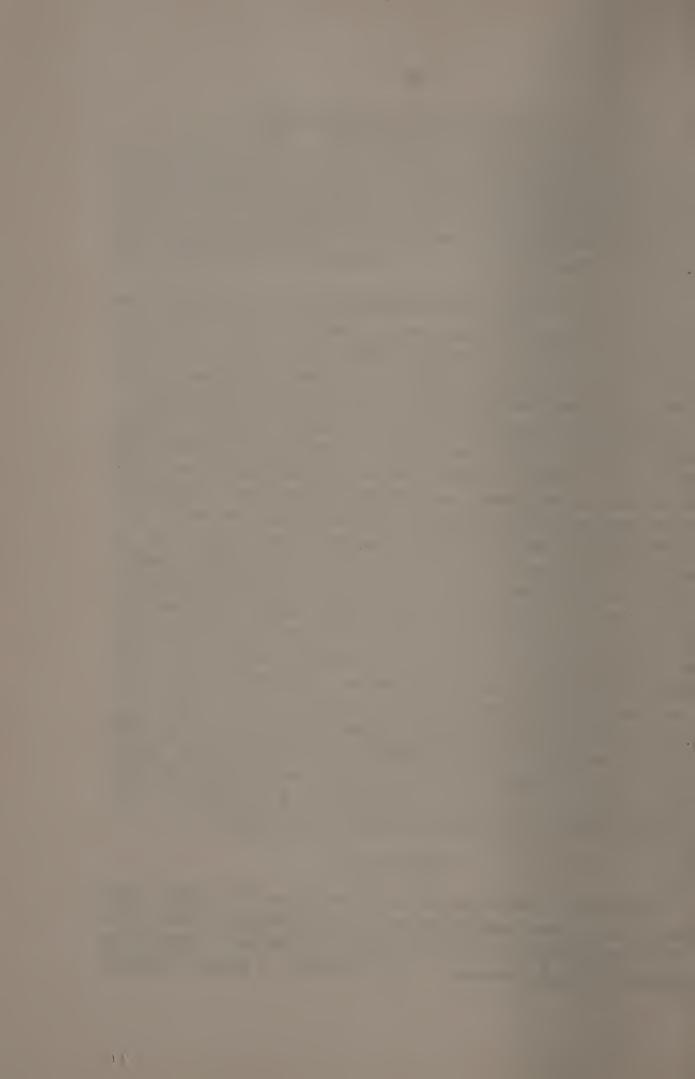
Fixed trunks of plate not over $7\frac{1}{2}$ pounds per square foot to be built between decks in the coal-bunkers, of the size indicated, and located where shown on the plans; to be stiffened by vertical angle-bars $2\frac{1}{2} \times 2\frac{1}{2}$ inches of 5 pounds per foot; to be so arranged as to supply coal to both the upper and lower bunkers.

Hinged water-tight covers same thickness as the protective-deck to be fitted to the openings within these trunks, for coaling the lower bunkers and made to open from below as well as from above this deck, the openings to be as large as possible to conveniently swing the covers up in the trunk.

The doors in trunks for supplying upper bunkers to be in depth about 2 feet 9 inches and as wide as the trunk will admit, and located in upper part of trunk, hinged on inside to swing in the trunk, and supported by proper angles, the edges resting thereon against sides of trunk; to be fastened when closed so as to be opened from the bunker or from the inside of the trunk as desired, rounds of iron forming a ladder to be secured on the outside of trunk extending up to this door. The doors for trimming coal from the upper into the lower bunkers to be close down to angle-bar on top of protectivedeck, to be made as wide as the trunk will admit and in height about 3 feet, to be worked by means of a screw or rod from the gun-deck, as directed by the superintending constructor. Iron rounds for ladders will be placed on inside of all trunks, also on bulkheads below trunks, to afford means of escape for the coal-trimmers. The bounding-angles at top and bottom of trunk to be $2\frac{1}{2} \times 2\frac{1}{2}$ inches of 5 pounds per foot. All this work to be calked and made water-tight.

BILGE-KEELS.

To extend from frame 27 to frame 77 on each side of the vessel and placed where shown on the midship-section; to be in a fore-and-aft plane so as to meet with the least resistance in passing through the water. To be formed of plates 15 pounds



per square foot and secured to the bottom plating by 5×3 inches of 10 pounds angle-bars. To be in depth 24 inches clear of the bottom plating, the fore and after ends to be neatly tapered down to the bottom, and the outer edges riveted together through a tapered bar of steel $3\frac{3}{4} \times 1\frac{1}{4} \times \frac{1}{2}$ inch. The space between the plates to be filled in with white pine, and all to be worked as shown on the plans.

MAGAZINES.

The magazines, light-boxes and trunks to same, to be considered as water-tight compartments; all to be calked and made thoroughly water-tight; located where shown on the plans, and formed of plating 10 pounds per square foot, worked lap-jointed and single-riveted, and stiffened vertically by anglebars $3 \times 2\frac{1}{2}$ inches of 6 pounds per foot, placed about 30 inches apart; those to the center vertical bulkhead forward to be placed about 24 inches apart, with a horizontal T-bar $4\frac{1}{2} \times 3$ inches of $8\frac{1}{2}$ pounds per foot worked on opposite side.

The floors of magazines to be fitted with gratings and all metal work to be well coated with cork-paint. The trunks leading up above the protective-deck to be of the size shown on the plans, and made of plating 8 pounds per square foot, and connected by suitable angle-bars; to be also lined with wood on the inside as directed; suitable metal water-tight covers to be fitted to the top of trunks and also at tops of

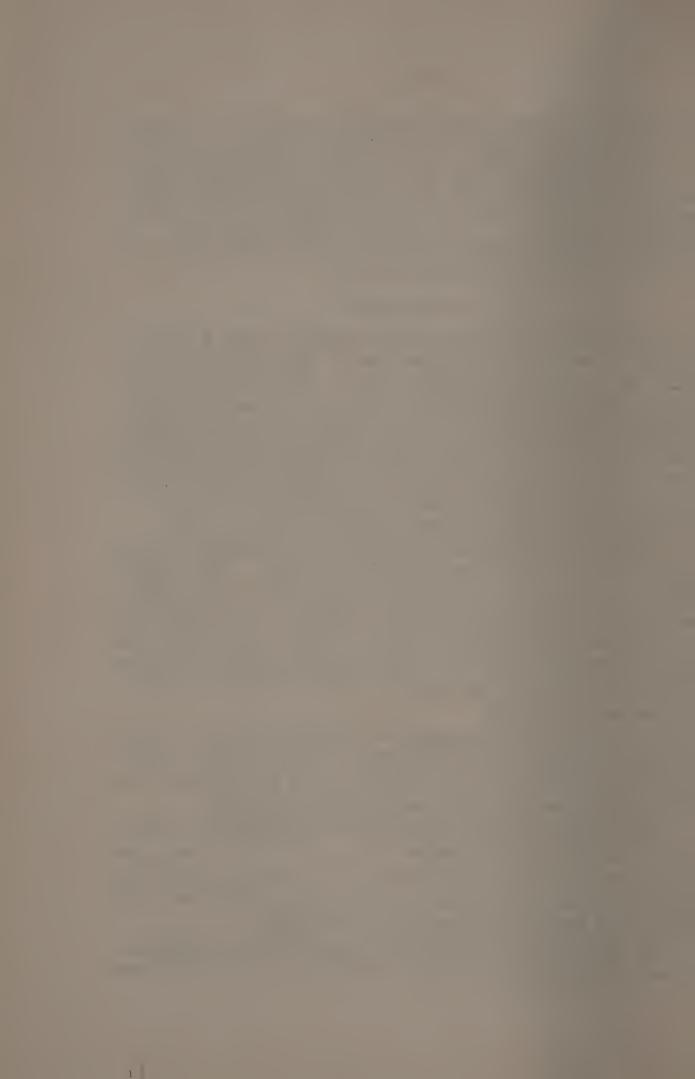
magazines, as required.

The magazines to be carefully ventilated; the cowl or other openings through which the fresh air is drawn should have a water-tight sliding shutter fitted to it, so as to prevent water

from getting into the pipes leading to the magazines.

The position of inlets and outlets in the magazines will depend somewhat on the stowage of cases, &c., in the same, but they must be placed as near as may be at opposite ends of the magazines, the outlet to be in the top near passage-way and the inlet in bottom at opposite end of magazine.

The orifices of all exhaust and supply-pipes to magazines to have strong brass water-tight sliding-covers fitted over them



of equal strength to the magazine bulkheads, so as to effectually resist fire from explosion on the outside. These brass evers are to be worked from the passage-ways next the magazines by means of rods and hand-wheels fitted with indicators near them, to show whether the shutters are open or shut.

All pipes communicating with the magazines are to be so arranged as to prevent anything being passed directly from their upper orifices into the magazines; wire gauze to be fitted

over all orifices as directed.

Where pipes or cowls, for the supply of fresh air or otherwise, are carried above the topside and exposed, the continuity of the pipe should be broken by an insulator of strong vulcanite or wood tubing, not less than 4 feet long, to be fitted outside the magazine compartment. These pipes, along which the lightning may travel, are to be connected above the vulcanite break to an iron beam or other continuous metal conductor, by which the electric fluid can pass without interruption to the sea.

Speaking-tubes led to the magazines, or passages to same, from suitable positions near the guns, &c., are to be fitted; and wherever they are fitted, care is to be taken to break the continuity of the copper pipes in order that they shall not become conductors of lightning to the magazines. Arrangements are also to be made and fitted for flooding the magazines direct from the sea, by means of stop-valves in connection with pipes and sea-cocks; also overflow pipes are to be fitted as directed, and drain-pipes and valves for freeing the magazines. The flood-cocks to be kept as far away from the coal-bunkers as possible. All these cocks to be fitted to work from the berth-deck, and arrangements made to lock them securely, and means also to be taken for indicating on this deck whether the cocks or valves are open or shut.

In order to get rid of any water which may remain on the outer steel lining of the magazines, floors, or ceiling, holes to be drilled in the plating and fitted with brass screw-plugs, to allow the water to run to the bilges; to be fitted with suitable

covers, as directed.

All metal fittings in the magazines to be of brass, made and fitted as directed. Ash ladders to be made and fitted as required; also all shelves, battens, stanchions, racks, &c., for the proper stowage, complete. Light-boxes to be fitted complete as usual in the U.S. naval service.

PASSING-SCUTTLES.

For ammunition, to be of composition, 15 inches diameter in the clear; to be fitted with water-tight lids, and put in the several decks wherever directed.

SHELL-ROOMS.

To be built, lighted, flooded, drained, and ventilated as described for magazines. The vertical stiffeners may be placed on the outside, so as not to interfere with the stowage of shell. The rooms not to be lined, but the whole internal surfaces to be well coated with cork-faced paint. The trunks to be also fitted with water-tight covers to the scuttles, and the inside of the trunks to be lined with hard wood if directed. Provision also made, by means of water-tight man-holes, for examining and painting the frames and plating of the hull of the vessel where required.

FIXED AMMUNITION-ROOMS.

To be built, lighted, drained, and ventilated similar to the shell-rooms, and provision made for examining the vessel as there required.

TORPEDO-MAGAZINES.

To be built, lighted, ventilated, &c., as required for the shell-rooms, and fitted with racks, shelves, &c., for stowage of torpedo-heads, as directed.

TORPEDO OUTFIT AND STORE-ROOMS.

To be ventilated as directed, and the whole internal surface to be well coated with cork-faced cement. The rooms to be fitted up with racks, shelves, &c., for the proper stowage of torpedoes and torpedo-fittings, as required.

PLANK-SHEERS OR WATER-WAYS.

On poop and forecastle-decks to be of the best selected yellow pine, and in thickness 4 x 8 inches wide on top; those to the bridges to be in thickness 3 x 8 inches wide on top. Waterways of yellow pine to be worked around the gun-supports, also on the berth-deck, and at other places where required; to be of proper thickness, and sufficient width to house the nibs of the deck-plank, and fastened with \(\frac{5}{8}\)-inch galvanized-iron bolts and nuts.

DECK-PLANK.

The plank of the several decks to be of the specified thickness when completed, and the under sides to be well fitted to the plating, and thickly coated with red lead or other approved material; the edges to be planed fair before the plank is laid, and to have a proper seam for calking. The whole of the material to be of seasoned fine-grained Georgia yellow pine, free from knots, sap-wood, and other defects. The running plank to be worked in lengths of 25 to 30 feet, and each strake of plank, water-way, or plank-sheer is to be secured by galvanized-iron bolts and nuts; the heads to be plugged and the plugs to be set in white lead, and in order that the bolts may be properly placed relatively to the edges of the strakes the holes will be drilled in the plating and beams after the strakes are laid off. Where there is no plating the butts of the deck-plank will be underlaid with plates from 5 to 10 pounds per square foot, according to location, and sufficiently long to properly stow the butt-fastenings only; the plates to be same width as the planks and to be riveted to the beams. The whole of the decks, flats, &c., are to be planed fair on the upper side; but this work is to be deferred as long as possible so as to facilitate handing the vessel over to the Government with the decks in perfect condition. During completion of the ship the necessary provision must be made to preserve the decks exposed to the weather.

To Poop and Forecastle-decks.—Not over $4\frac{1}{2}$ inches wide by $2\frac{1}{2}$ inches thick, except under the housings of the anchors,

where it will be made thicker, if directed. To be fastened to the deck-plating, beams, &c., with flat-headed screw-bolts not less than ½-inch in diameter, and distributed in the planking may be directed by the superintending constructor.

When decks are entirely covered by plating a hemp grummet, saturated with red lead, will be placed between the deckplating and the head to make the bolt water-tight in the deck-

plating.

To Gun-deck.—To be not over 6 inches wide by $3\frac{1}{4}$ inches thick, the thickness, however, will be increased where required in wake of the guns, also under the windlass, and where subject to the chafe of the chain-cables. To be worked and fastened in all respects as directed for the poop and forcastledecks, except that the bolts will be not less than $\frac{9}{16}$ inch in diameter; to be $\frac{5}{8}$ inch where the plank is more than $3\frac{1}{4}$ inches thick.

To Berth-deck.—To be in width 6 inches x 3 inches thick, to be worked and fastened similarly to the main decks, except that the bolts will be $\frac{9}{16}$ inch in diameter.

The Platform-decks.—Forward and abaft the machinery space, where required, to be 2 inches thick and treated same

as other decks.

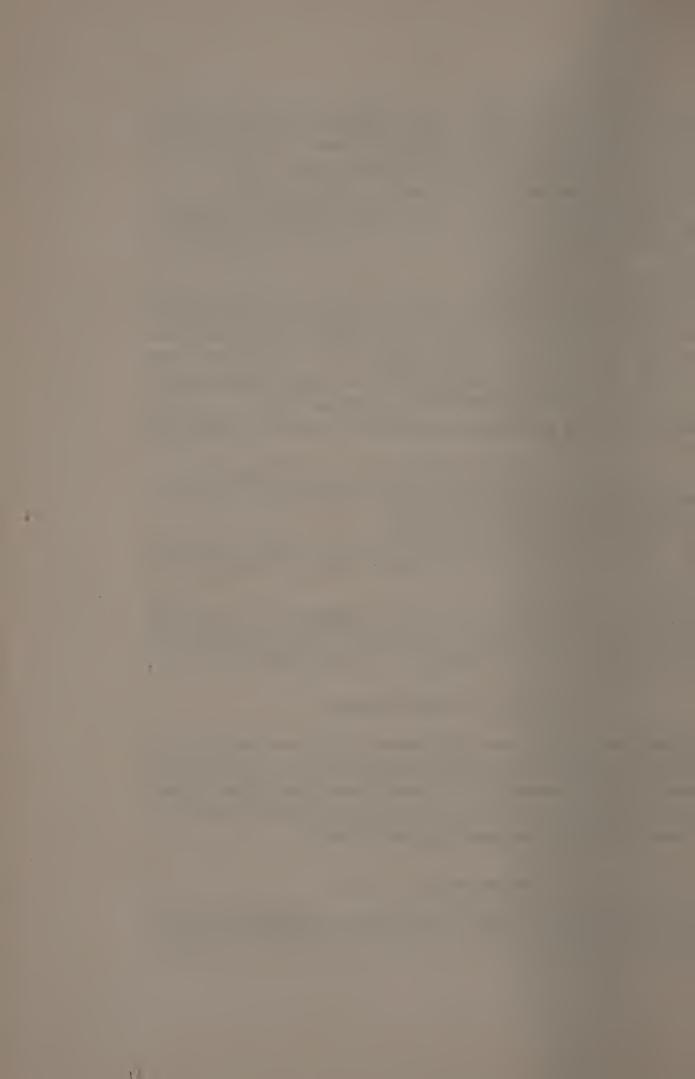
The decks to the bridges to be $3\frac{1}{2}$ inches wide, not less than $2\frac{1}{4}$ inches thick in the thinnest part, and fastened similar to the forecastle-deck except that the bolts will be $\frac{7}{16}$ inch in diameter.

TORPEDO ARRANGEMENTS.

The outboard portion of the tubes which are secured to the ship will be fitted by the contractor and made of cast-steel; this portion of the vessel is to be made complete as far as possible by fitting the necessary plate-covers, shutters, plugs, &c., as directed by the superintending constructor.

SPONSONS FOR GUNS.

To be built where shown on the plans, subject, however, to such slight changes in details as may be required by the system



of gun-mounting adopted. To be shaped and supported on the outside by bracket-plates 15 and 20 pounds per square foot, and angle-bars 3 x 3 inches of 7 pounds per foot, which will be plated over as directed; the brackets to be well riveted to the outside plating and main frames of the hull, and to be lightened with holes sufficient, if practicable, to afford passage through them. A man-hole to be provided in the gun-deck to give access to the inside of sponsons amidships for cleaning and painting. The sponsons under forecastle and poop-decks to have access through the man-holes in the vessel's side, if practicable; hand-holes to be cut where necessary for the same purpose, and all man-holes, &c., to be fitted with water-tight covers.

PLATFORMS FOR GUNS.

The platforms for machine and other guns to be built where shown on the plans, complete and ready for service.

GUN-SUPPORTERS.

The main battery guns will be mounted on the central-pivot system, and will be placed as shown on the plans. necessary supports and local strengthening will be provided by the contractor, and will be of the character indicated generally in the drawings. The main support of each gun will consist of a partial cylinder about 6 feet in diameter, except to two of the midship-guns, and all to extend down to the decks and to the frames or plating of the vessel, to which they will be secured by means of angle-bars and plates. The plates composing the cylinders, &c., to not exceed 15 pounds per square foot, and stiffened with angle-bars where shown on the plans, or as may be directed; the angles connecting the plates to the decks to be 3 x 3 inches of 7 pounds per foot, and placed on the outside of the cylinders, the stiffening-angles to be on the inside, and generally 3 x 3 inches of 7 pounds per foot. The plates to be lightened with holes where required, and where doorways are cut to admit of the space within being used for particular purposes; to have wood or steel doors fitted complete, as directed.

These gun-supports will not pierce the deck-stringers or

plating.



MAST-STEPS.

To be of cast-steel, and located and supported as shown on the plans.

AIR-PORTS.

To be in number and location as shown on the plans, and made in accordance with a pattern furnished by the Bureau of Construction and Repair; the frames to be of brass and the glass of good clear quality; those on forward and after berthdeck, also under poop and forecastle-decks, to be not less than 12 inches in diameter by $1\frac{1}{2}$ inches thick; to be fitted with drippipe and brass cock complete, the lower elbow and section of pipe to be of iron about $\frac{3}{4}$ inch outside diameter.

Large square air-ports to be fitted where shown on the plan,

to give additional light to the ward-room.

The coaling-port shutters on the outside of the vessel amidships to have air-ports fitted in them 10 inches in diameter by 1½ inch thick glass, and hinged, &c., similar to the other air-ports.

The boiler-gallery and engine-room hatch-inclosure will be fitted with fixed lights of good clear 1-inch thick glass, 12

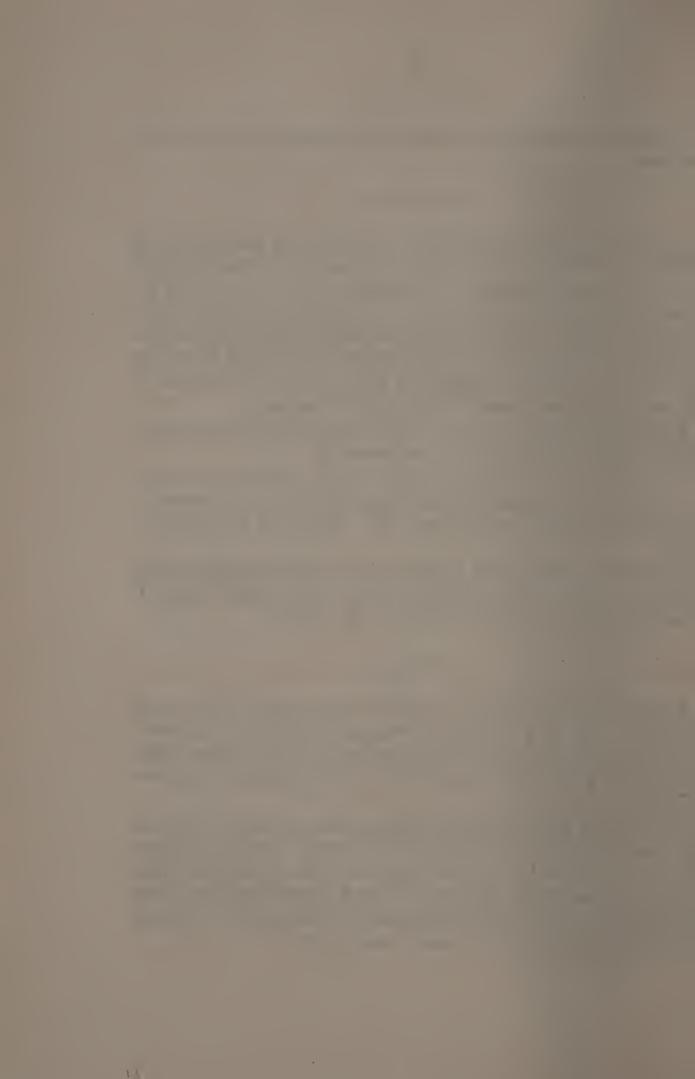
inches in diameter, where shown on the plans.

SCUPPERS.

In number and location as shown on the plans, those to the gun-deck to be of galvanized wrought-iron tubes 6 inches diameter by $\frac{28}{100}$ inch thick, and connected to the stringer-plate and outside plating by angle-rings $1\frac{1}{2} \times 1\frac{1}{2}$ inches of 2 pounds

per foot.

To be fitted with composition flap-valves secured on the outside and gratings or covers on the inside. 2-inch wrought galvanized-iron tubes will be fitted on each side at the lowest place in the berthing directly over and connecting with these scupper-pipes below, for the purpose of draining the berthing; all connections, &c., to be made water-tight.



The scuppers to the berth-deck will be of galvanized wrought-iron tubing $4\frac{1}{2}$ inches in diameter and located where shown on the plans, secured with angle-rings, and fitted with composition flap-valves on outside; also gratings and covers on inside similar to the gun-deck scupper. Provision will be made for securing the valves from the inside against the entrance of water when the vessel rolls.

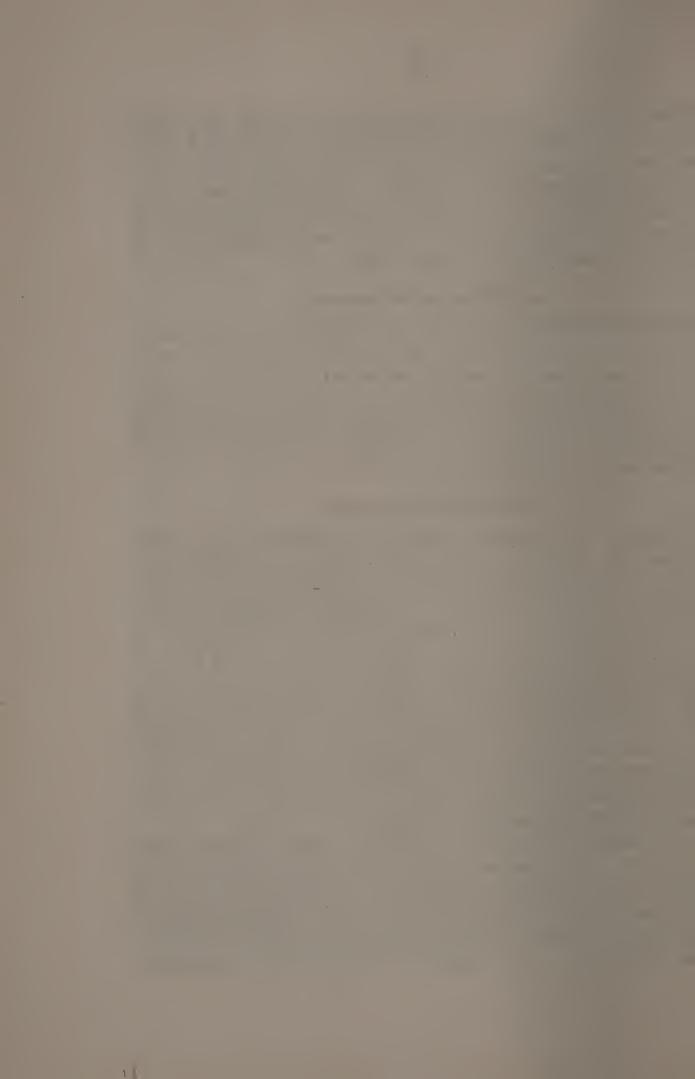
GUTTERS ON GUN-DECK.

To extend between the guns from the poop to the forecastle-decks as shown on the plans; the outer bar to be 5×3 inches of 10 pounds per foot, and the inner bar to be $3 \times 2\frac{1}{2}$ inches of 6 pounds per foot; the bars to be worked in as long lengths as practicable, the gutters to be flush-riveted, calked and made water-tight. Wood or iron gratings to be fitted over the gutters where necessary.

HAMMOCK BERTHING.

To be of the shape and dimensions as shown on the plans, the outside to be worked as a continuation of the outside plating between the poop and forecastle-decks, the top plate $7\frac{1}{2}$ pounds and the remainder generally 10 pounds per square foot; the plating in wake of the flash of the 6-inch guns will 15 pounds per square foot; half-round iron or steel $2\frac{1}{2} \times 1\frac{1}{4}$ inches to be worked on the outside, as shown on the plans. The inner plating to be $7\frac{1}{2}$ pounds per square foot except in wake of the rigging, where the lower plate will be 15 pounds per square foot, to be connected on the inner side to the deck-stringer by angle-bar 5×3 inches of 10 pounds per foot, forming part of the gutter-way; the plating to be worked flush with the butt-straps on inside.

The frames to be spaced about 3 feet apart, as directed, and clear of the beams below; to be formed of angle-bars $2\frac{1}{4} \times 2\frac{1}{4}$ inches of $3\frac{1}{2}$ pounds per foot, to be stiffened at about every third frame with plates 8 pounds per square foot, and lightened with holes as shown. Special frames and stiffening plates, as may be required, to be worked at the skid-beams, gangways,



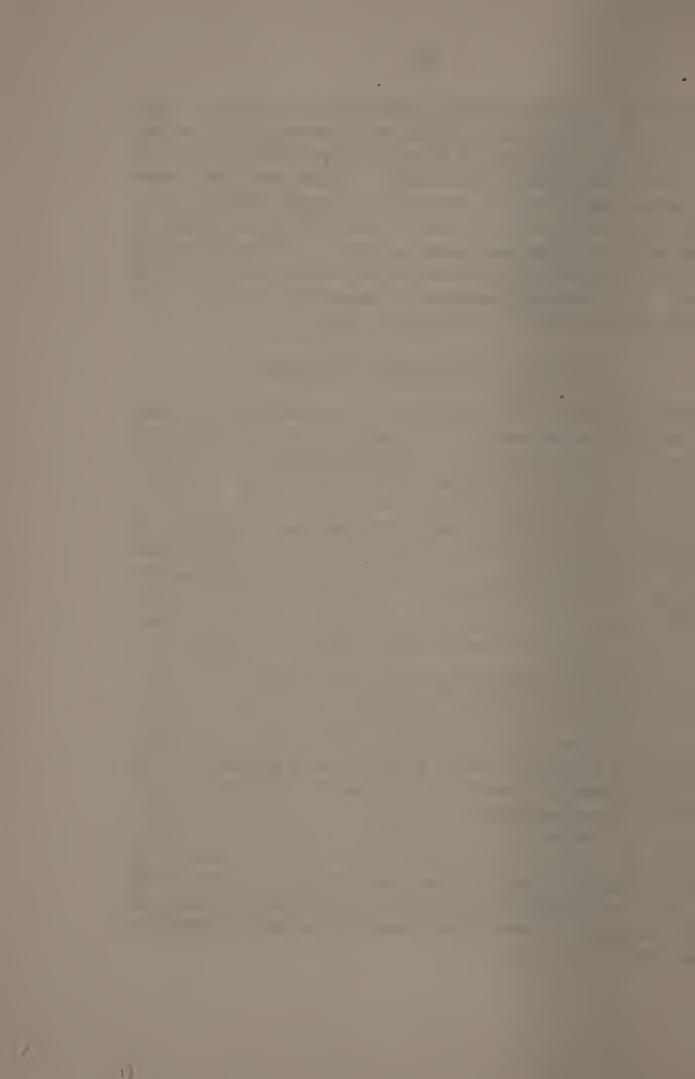
gun-ports, boat-davits, chocks, and wherever directed; those abreast of each shroud and stay to be made of 10 pounds plate and $2\frac{1}{2} \times 2\frac{1}{2}$ inches of 5 pounds angle bars, as shown on the plans, unless otherwise directed. White-pine strips about $1\frac{1}{2}$ inches square will be secured to the angle-bars by means of screws, and berthing-boards of white pine to be secured to these strips for the hammocks to rest on. Yellow-pine rails about 3×3 inches to be worked on the inside, as shown on the plan. All necessary eye-bolts for hammock-cloths and other purposes to be fitted; to be made of brass.

HATCH-COAMINGS AND SKYLIGHTS.

On poop-deck to be of mahogany, on forecastle, gun, platforms, and forward berth-decks, except where otherwise shown or stated, as flush hatches; to be of steel plate of the required dimensions, and well secured to the deck frame. The skylights to be fitted with hard-wood frames, and, except on poop-deck, to be sunken below the bottom of gratings, all glazed with thick clear glass, protected by heavy brass rods, set in independent frames; all to be properly hinged and arranged with brass quadrants to keep in place at the required angles when open. The metal coamings to have round corners and, except at the water-tight hatches, to be fitted with $1\frac{1}{2} \times \frac{3}{4}$ inch half-round bar on outer top edge, and $1\frac{1}{4} \times 1\frac{1}{4} \times 1$ inch angle-bar on inside to support the gratings; the plate not to exceed 8 pounds per square foot, secured by angle-bars 31 x 21 inches of 6 pounds per foot; those to the high hatches on gun-deck to be $3\frac{1}{2} \times 3$ inches of 8 pounds per foot.

All hatches and scuttles on the after berth-deck, also on platforms over magazine and shell-rooms, to be fitted with flush water-tight covers below the surface of berth-deck, and over which the wood scuttles or covers flush with the deck-plank will be placed; both to be fitted with proper handles to lift off.

Hatches in platforms forward and abaft the magazines and shell-rooms to be fitted with water-tight covers, as shown on the plans.



The top of the engine and fire-room hatches to be fitted with light iron gratings, and in order to afford proper ventilation during bad weather, and for support of tarpaulins, a canopy or frame-work of brass pipe will be built over each engine-hatch, the center ridge-pole to be not less than 30 inches above the top of the coaming and from that point down diagonally to 12 inches below the hatch at sides; projecting 12 inches outside, on the lower ends of these pipes, there will be attached horizontal pipes, also elbows to connect to the hatch, to take the whole weight of the canopy, &c. The horizontal pipe to which the tarpaulin will fasten to extend all around the coaming; all the pipes to be about $1\frac{1}{2}$ inches in diameter, also the supports and castings to secure same to hatch to be of brass; all this work to be done in the most thorough and satisfactory manner.

GRATINGS AND HATCH-COVERS.

Gratings or solid hatches, or both, as may be directed, to be fitted to the hatchways or other openings; to be either wood or iron, as required. All hatches or scuttles to water-tight compartments or flats to be fitted as shown on the plans, or as may be directed under the head of hatch-coamings and skylights.

RUBBING-PLATES.

To be of brass, and fitted over all fair-leaders and sheaveholes in the vessel's side, and elsewhere as directed.

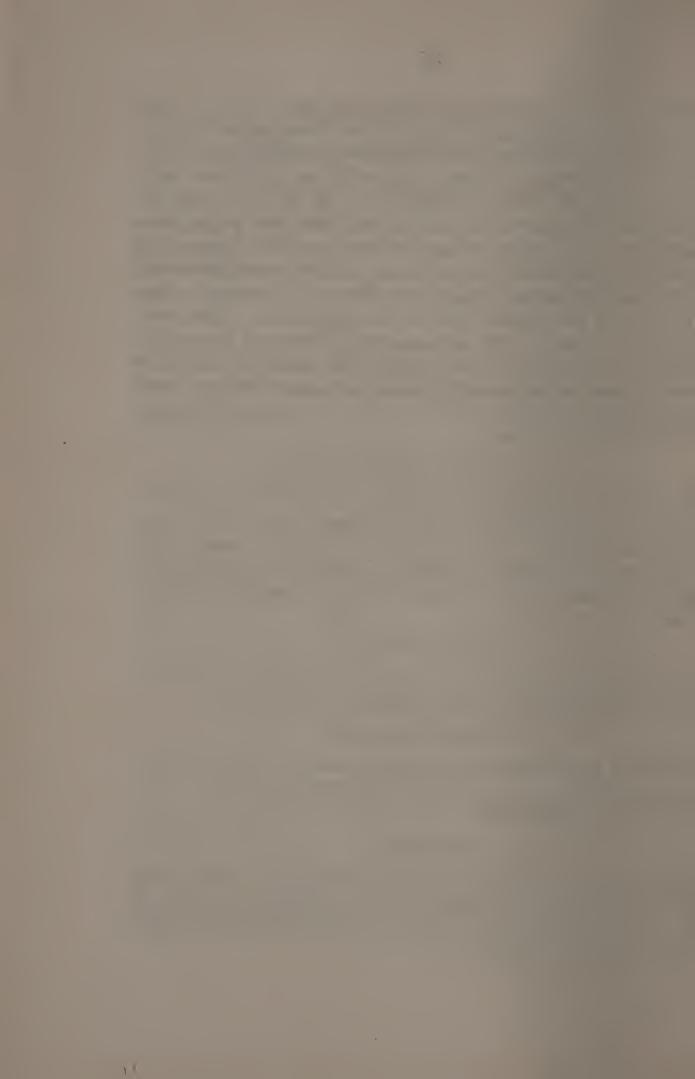
AWNING STANCHIONS.

To be of iron and fitted as directed, complete, with all necessary appliances, as usual in the United States Navy.

Heels to be galvanized.

CANOPIES.

The frames to hatches forward of mainmast to be of galvanized iron gas-pipe, those to the after hatches to be of brass and to be made as light as consistent with the strength required; all to be fitted as per plan.



IRON ROUNDS OR LADDERS.

To be fitted to the bulkheads where directed.

LADDERS TO HATCHWAYS, ETC.

Are to be of hard wood, as may be directed; to be fitted as required. Brass eyes to be put in heels of all ladders for man-ropes. Backs to be fitted to ladders where directed. Hatch-bars and covers to be fitted with galvanized-iron ringbolts, &c. All companion-ways to be provided with stanchions and grab-rods, and the steps to be covered with brass plates where required. Iron rings to be fitted to bulkheads and stanchions in hold under hatches in place of wooden ladders, as may be directed.

HATCH-CRANES.

To be made of galvanized iron, fitted and stowed as directed.

SHOT-RACKS AND MUSKET-RACKS.

To be made of iron and mahogany, and fitted round hatchways and along the side of the vessel, as directed by the superintending constructor.

ATTACHMENTS FOR RIGGING, CHAIN-PLATES, BOLTS, ETC.

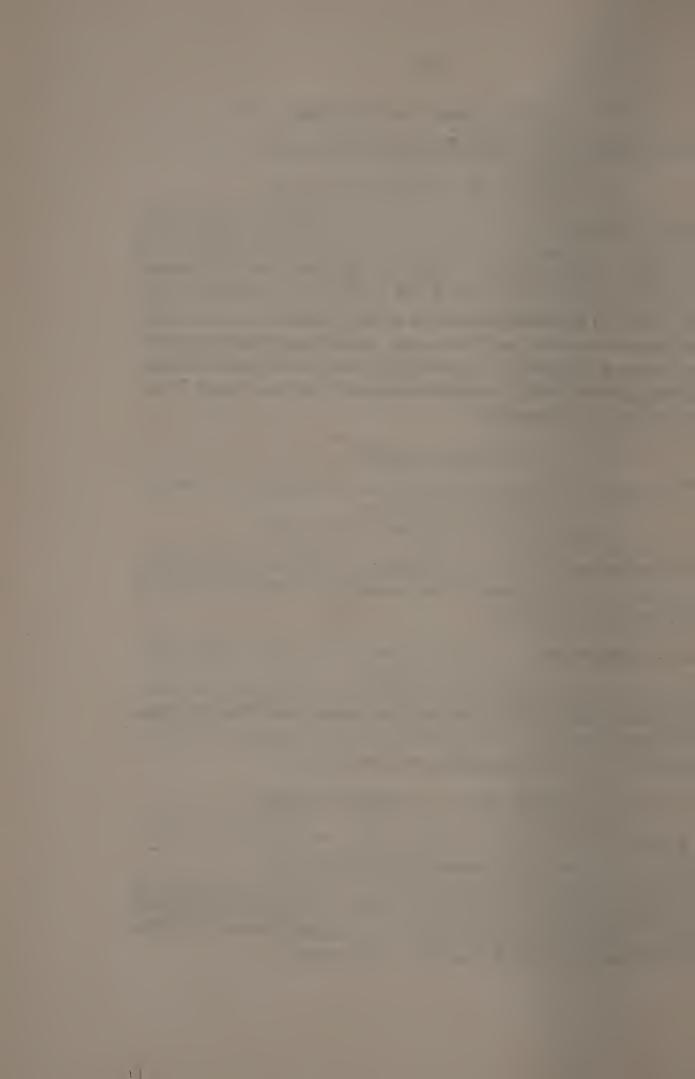
All plates, eyes, eye-bolts, shackles, &c., necessary for securing the rigging to the hull of the vessel, will be made and fitted, and additional strengthening angles and plates will be worked for this purpose wherever required.

GUARD-RAIL AND STANCHIONS.

To be of iron pipe around the sides and after-end of fore-

castle, and to be made portable where required.

Brass hand-rail and stanchions to be fitted all around the poop-deck, around all bridges, and on top of wooden pilothouse. Brass or iron hand-rails and stanchions to be fitted around hatchways and elsewhere as directed.



LASHING-BOLTS AND SHACKLES FOR SECURING GUNS.

To be made and fitted where directed.

CHOCKS FOR FAIR-LEADERS.

To be fitted with fair-leads, brass sheaves, rubbing-plates, and pins, complete.

FIFE-RAILS, PIN-RAILS AT SIDE OF VESSEL, MAIN TOPSAIL BRACE AND TOPSAIL-SHEET BITTS TO MASTS.

To be fitted complete as per plan, with brass rails and bitts, locust stanchions around fore and main-masts, brass hawse-rails between stanchions, lignumvitæ leaders between stanchions and hawse-rails; stopper-bolts and all necessary bolts and fittings. A brass hawse-rail will be put on the combing of mizzen-mast to receive the leaders; main topsail brace-bits and all the bolts around the mizzen-mast will be made of brass.

LUMBER-IRONS.

To be fitted under the water-tight deck in hold and elsewhere as directed.

LIFE-BUOY GUARDS.

To be fitted as directed, and suitable to the buoys furnished by the Government.

JACOB'S LADDERS.

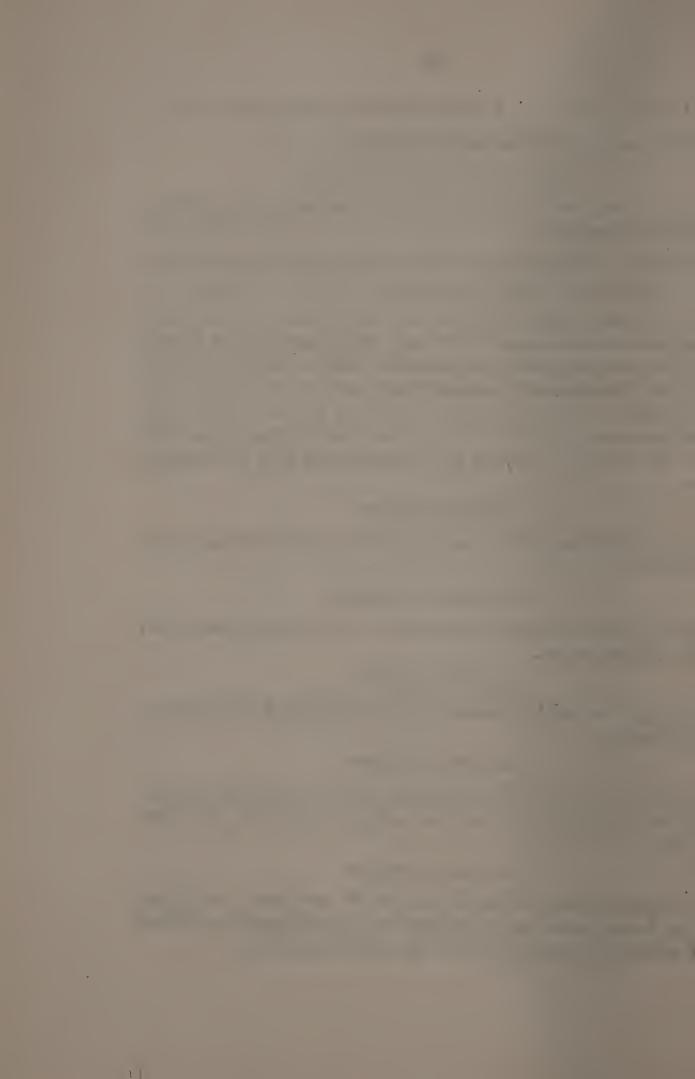
Fittings for Jacob's ladders to be provided and fitted whereever directed.

RUNNING-LIGHTS.

Fittings to be made and secured for the reception of these lights as directed by the superintending constructor, located as per plan.

SWINGING-BOOMS.

Swinging-booms with all iron-work necessary, including straps, bands, crutches, eye-bolts, &c., for the proper working and stowing of the same, to be furnished and fitted.



ENSIGN STAFF.

The necessary iron-work to support the same to be fitted complete.

DECK-LIGHTS.

Circular glass deck-lights of approved pattern will be put in the decks wherever required, to give light to rooms below.

WATCH-BELL.

A clear-sounding bell, not less than 500 pounds in weight, with the ship's name and date only neatly engraved thereon, is to be provided, fitted, and hung as directed.

BOAT-DAVITS AND CRADLES.

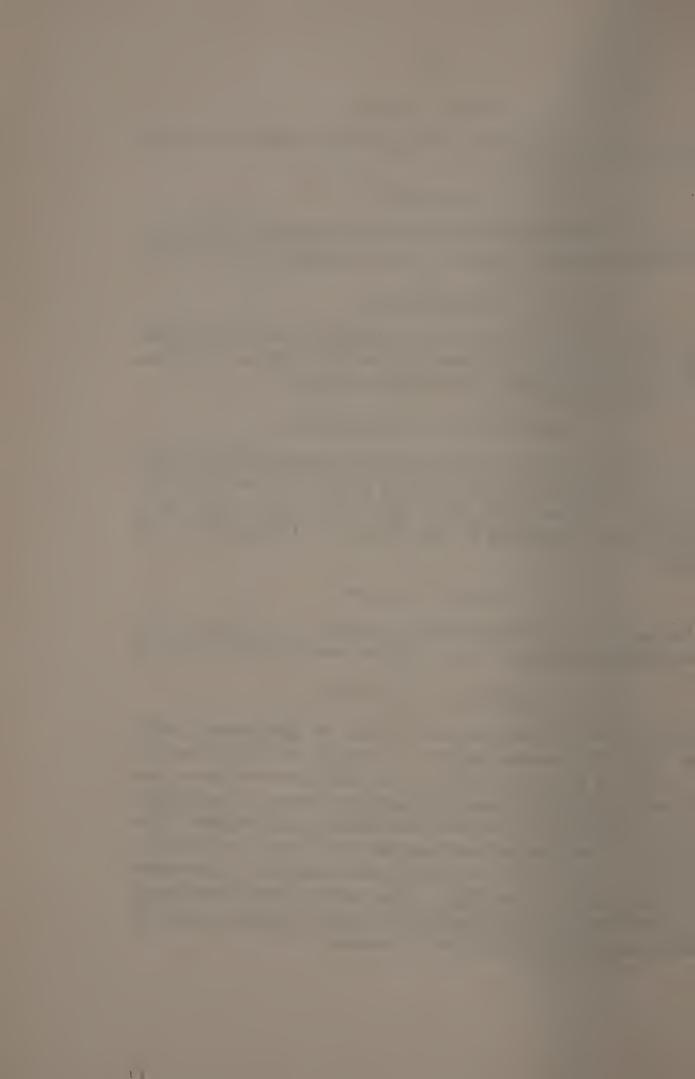
To be of hammered scrap-iron, and in size and shape, number and location, as shown on the plans. To be fitted with chain-guys, topping-lifts, griping-irons. The cradles to be fitted to molds supplied by the Bureau of Construction and Repair.

HAMMOCK-HOOKS.

Of ample number for berthing the crew, to be fitted to the forecastle and gun-deck beams or elsewhere, as may be directed.

WOODEN PILOT-HOUSE.

To be built of mahogany and located on the forward bridge just abaft the conning tower. The deck of this house shall be raised at least 3 feet above the bridge or so that a clear view can be obtained over the conning tower. The framing is to be entirely of wood and the fastenings of copper. The roof should be planked and covered with canvas and painted. A ladder should lead to the roof, which should be surrounded by brass railing 3 feet high. The deck of the house should be neatly laid in hard wood, and the space between it and the bridge-deck fitted for lockers if required.



The windows should be of plate-glass, and most carefully hung, with blinds on the outside. The house to be fitted with transom, chart table, lockers, drawers, side-slips, speaking-tubes where required, rudder tell-tale, steam steering-wheel, engine-room telegraphs and indicator.

CONNING TOWER AND SHIELD.

The tower to be cylindrical in form, located on the forward bridge as shown on the plans; built of steel 3 inches in thickness, diameter in the clear to be 8 feet 6 inches; to be secured to the bridge-plating by inner and outer angle-bars 4 x 4 inches of 12 pounds per foot, well riveted to the plating, and tap-bolted to armor-plates with bolts 1 inch in diameter, flush-riveted, and pitched about 6 inches from center to center; the holes in the outer bar will stagger with those in the inner bar. The armor-plates to be in height not less than 6 feet 6 inches above the bridge-plating.

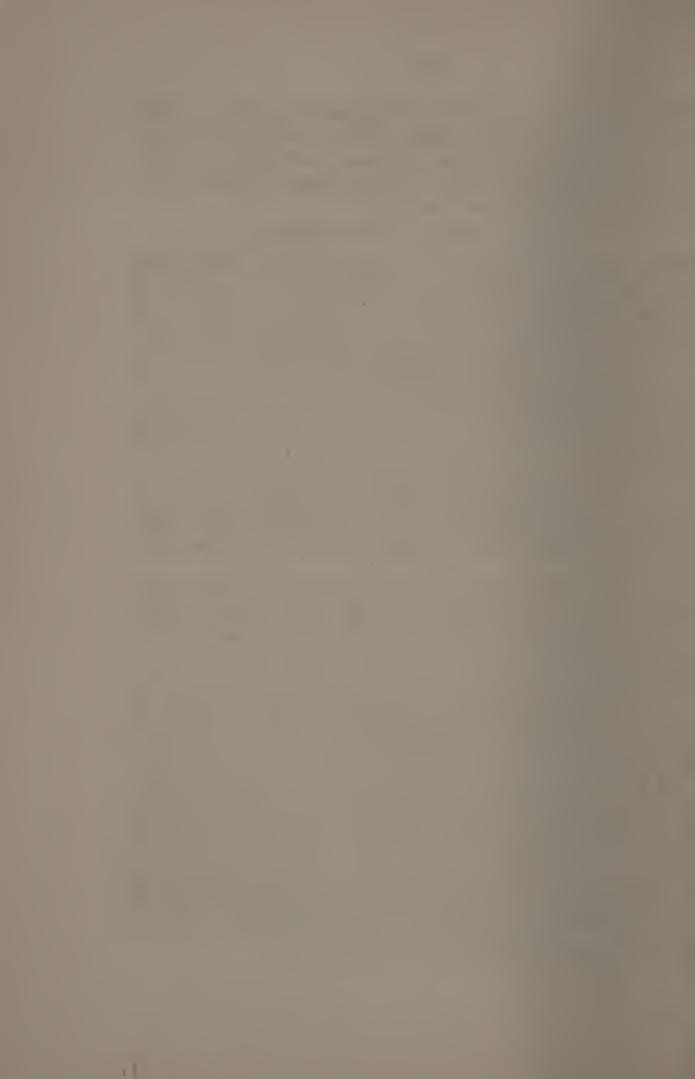
The tower to be fitted with a flat top or cover $1\frac{1}{2}$ inches in thickness, and tap-bolted to the armor-plates with flush counter-sunk bolts 1 inch in diameter, spaced 6 inches from

center to center.

Sight-holes will be cut in the armor-plates in size about 3 x 20 inches, for conning the vessel. The center of these holes in a horizontal plane to be about 5 feet 6 inches above

the plating of bridge.

The shield to entrance of conning tower to be in thickness and material the same as the tower and in width as shown on the plans; to be shaped to an inside radius of 6 feet and placed concentric with the tower, leaving a clearance of 18 inches for entrance to same. The tower will be fitted complete with steam-steering wheel, engine-room telegraph and speaking-tubes. A steel tube $2\frac{1}{2}$ inches in thickness by 12 inches diameter in the clear will be built to extend in one length from the protective-deck to about 4 inches above the bridge-plating, on which the conning tower is secured; to be connected to the plating of the bridge and decks by angle-rings 3×3 inches of 8 pounds per foot.



Brackets formed of 3 x 3 inches of 7 pounds per foot anglebars and 10 pounds per square foot-plates, lightened with holes, will be worked on the outside of this tube to support the conning tower and shield, as shown on the plans.

STEERING APPARATUS.

The steering-gear is shown on plans Nos. 17 and 18 of the official drawings. The tillers, keys, bolts, pins, and other working parts are to be of forged steel and accurately made.

The steam steering-engine, and the hand-wheels, drums, and clutches directly connected with it, the shaft leading to the sprocket-wheel, and the sprocket-wheel, are to be supplied and fitted under the machinery specifications, but all other work connected with the steering-gear will be done by the hull contractor.

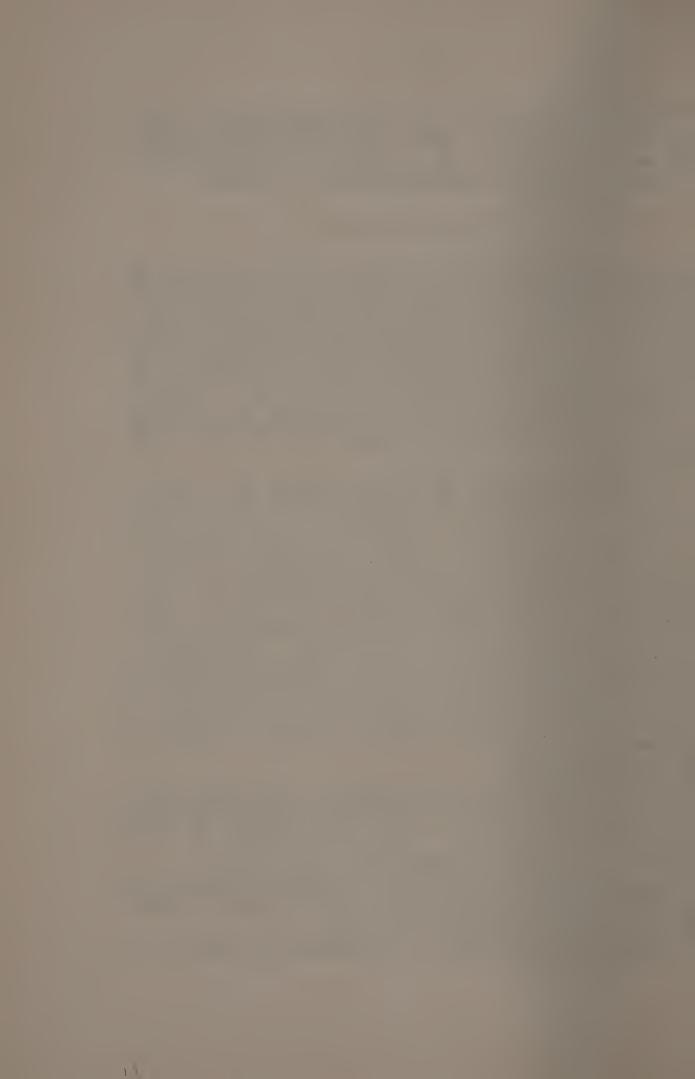
The steam-steerer will be located beneath the protective-deck and all connections with it are to be carefully protected or kept beneath this deck. Wheels for operating the valves of the steam-steerer will be placed on the main deck just forward of the poop, in the forward pilot-house, and in the conning tower. The shafting, standards, and all parts of these wheels above the main deck, are to be of brass or phosphorbronze, as they are adjacent to the compass. All gears connecting with these wheels are to be of phosphor-bronze and machine cut, the shafting to be carried in self-lubricating bearings, and every means to be taken to avoid friction; the connection to the valves of the steam-steerer to be made by the engine contractor.

Hand steering-wheels, of mahogany, with locust spokes, will be placed on the main deck just forward of the poop, working a vertical shaft. These wheels should be geared

down from the sprocket-wheel in the ratio of 5 to 1.

Hand steering-wheels shall also be fitted in connection with the steam-steerer, and should work either through the sprocket-wheel or tackles shown on the plan.

Tell-tales are to be fitted in the pilot-house actuated from



the tiller itself. All fittings necessary should be supplied to complete the steering apparatus satisfactory in all respects.

GALLEY-HOUSE.

The deek-house inclosing the galley to be on the gun-deck, in size and location, also ventilated, as shown on the plans, to be made of steel plates 8 and 10 pounds per square foot, and stiffened vertically by angle-bars $3 \times 2\frac{1}{2}$ inches of 6 pounds per foot on the inside and spaced about 30 inches apart.

There will be no deek-plank in the house, the deck-plating to be well cemented to receive tiles not less than 2 inches thick, on which the galley will stand. To be fitted with doors and scuppers on each side, also provided with air-ports, tables, metal shelves, lockers, dish-wash, drain-pipe and plug to same, hand-pump for drawing fresh water from tank, hand-pump for salt water, and metal coal-box to be fitted; all fittings to be complete and ready for use.

ASH-CHUTES.

In number and location as shown on the plans, and of the required size; the back plate next the vessel's side to be 10 pounds and the outside plate $12\frac{1}{2}$ pounds per square foot, connected to the outside plating by angle-bars $2\frac{1}{2} \times 2\frac{1}{2}$ inches of 5 pounds per foot, riveted to the $12\frac{1}{2}$ -pound plate and tapbolted through both plates into the plating of the vessel with $\frac{3}{4}$ -inch diameter tap-bolts about 7 inches apart. The upper part of chute passing through hammock berthing to be made of plating 10 pounds per square foot and angle-bars $2\frac{1}{2} \times 2\frac{1}{2}$ inches of 5 pounds per foot. The chutes to have guards or fenders of wood, 6 inches thick, fitted at their lower ends and eovered on outer edges with $\frac{3}{8}$ -inch plating.

DECK-PIPES.

The pipes for the passage of the cables to be located under after-side of windlass, as shown on the plans, and well rounded on top; to be made of cast-steel and to be fitted with steel-plate covers.



MANGER.

To be of angle-bulb about 5 x 9 inches deep of 24 pounds per foot, well secured through plating and beams; the deck-plank will be omitted forward of the manger.

WARPING-PIPES.

To be in number, size, and location, in the stern of the vessel, as shown on the plans, or as may be directed; to be made of cast-steel, fitted to the plating, &c., and secured in suitable manner; to be neatly rounded on the inside and outside for the passage of the hawsers, &c., also to be fitted with steel-plate shutters on the outside, hinged at the top, and means taken to secure them when closed or open.

CHAIN-LOCKERS.

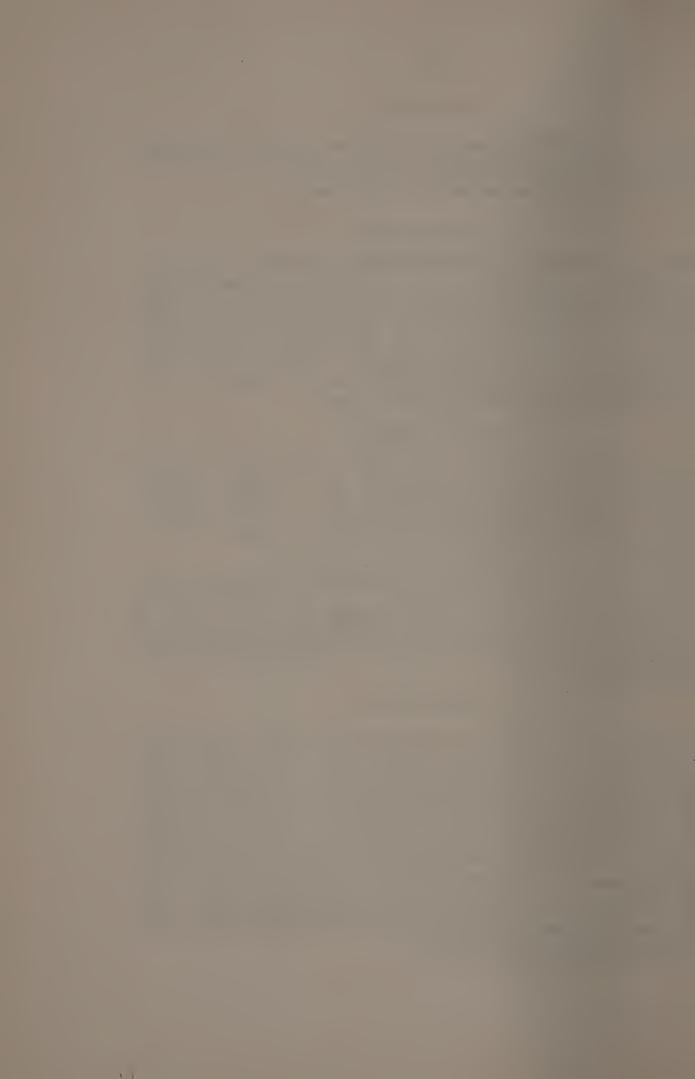
To be formed of plates 10 pounds per square foot, and stiffened by angle-bars 3 x 3 inches of 7 pounds per foot, spaced vertically about 2 feet apart, the bounding-angles at bottom to be $2\frac{1}{2}$ x $2\frac{1}{2}$ inches of 5 pounds per foot. All the lockers to be well calked and made water-tight.

Iron gratings to be fitted to the bottom of the lockers; also the sides to be battened, if required, and provision made for securing and slipping the cables by shackle or eye-bolts, and approved means taken for draining the water from the bottom

of the lockers.

WATER-TANKS.

To be located on top of the water-tight deck where shown on the plans, and built in the hull of the vessel, the bottom, top, and all sides to be well coated with the best of Portland cement, and nicely curved and worked up over all angle-bars, &c., so as to cover the metal completely. To be provided with all proper pipe connections to pumps, &c., and each separate tank or compartment to be fitted with a flush water-tight scuttle, as approved, in the berth-deck, to give access for cleaning; also provided with lock and key to secure same in place at all times, as required.



COAL-SCUTTLES.

On gun and berth-decks to be 18 inches in diameter in the bear, and in number and location as shown on the plans; to be fitted with solid covers and gratings of cast-steel, both so designed that they can be opened from above and below the berth-deck at all times, so as to give escape from the bunkers. Special escape-scuttles to be fitted when directed.

LADDERS (SIDE), SEA-STEPS, ETC.

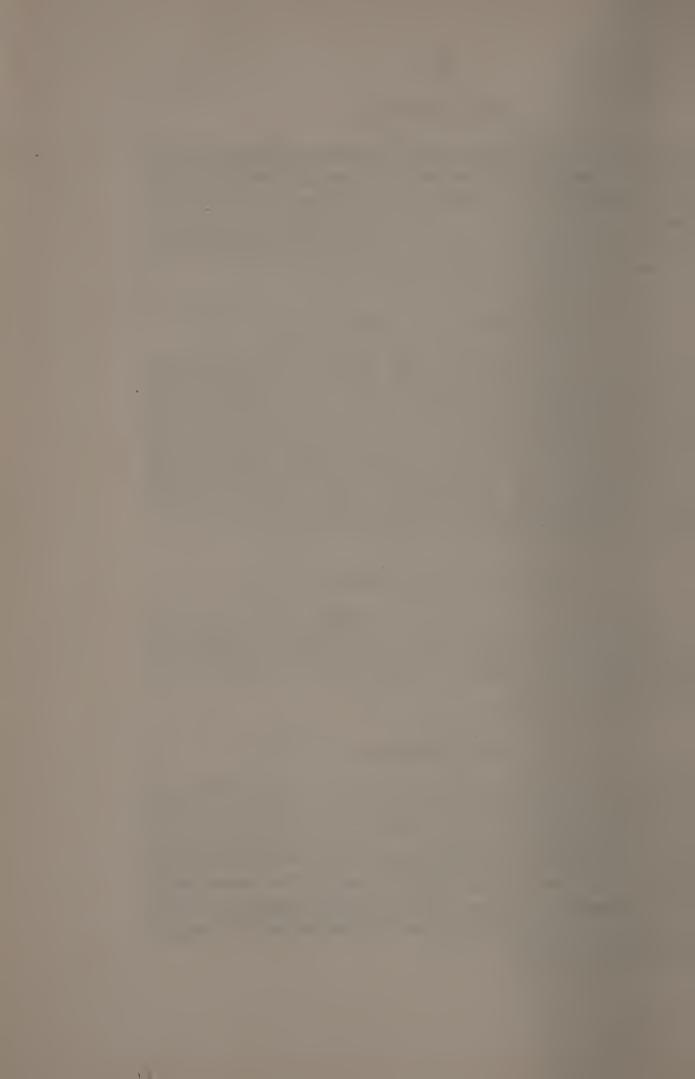
To be fitted on each side of the vessel with platforms, ladders, and gratings of white ash, also brass guard-rails and stanchions and eyes for man-ropes; the lower platform to be attached to the ladder, and the whole to be arranged to trice up by means of davit on side and bail in foot of ladder. The gangway-boards to be of mahogany carved and fitted as directed. A leadman's stool to be fitted; also sentry walk complete with all necessary rails, stanchions, &c.

WINDLASS AND CAPSTAN.

The windlass and capstan will be supplied and fitted by the engine contractors, but the holes in the decks for fastenings and the stowage and fitting of parts will be done by the contractors for the hull.

BOW-STOPPERS.

To be of cast-steel, located where shown on the plans, and of a pattern as approved, and to be secured through plates worked on top and bottom of beams in substantial manner as directed; to be filled in solid between plates with yellow pine. Care to be taken as to the height in fitting the wood-chocks under the stoppers, that they will effectually stopper the chain when required; eye-bolts to be fixed to the beams for working the levers, &c., as usual.



WIRE-CABLE NIPPERS.

There will be built and secured in substantial manner on the forecastle and poop-decks, as shown on the plans, nippers or compressors for wire cables, and to be of an approved pattern.

HAWSE-PIPES.

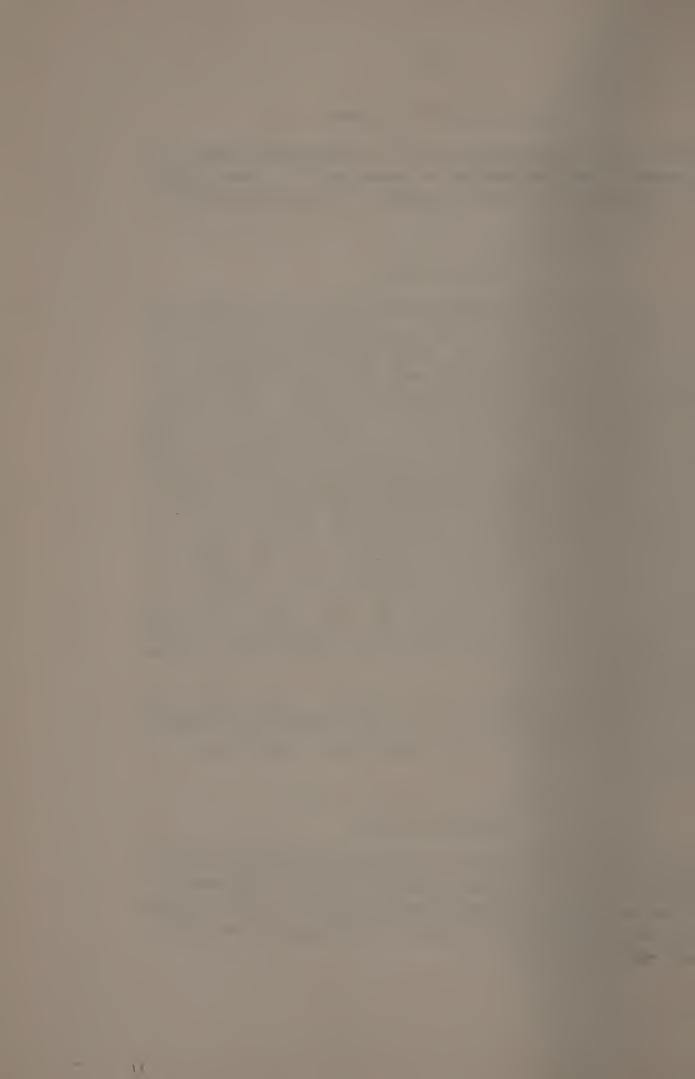
To be of cast-steel, in number and location as shown on the plans, diameter in clear of the casting $14\frac{1}{2}$ inches or sufficient to allow the shackles of chain to freely pass through in any position; to be well rounded and of suitable thickness, as approved, where the chain passes over them. Each casting will be inclosed in a water-tight wrought-steel pipe \(\frac{1}{4} \) inch thick, diameter in the clear 2 inches greater than the outside of pipe-casting, and connected to the deck and outside plating by angle-rings $2\frac{1}{2} \times 2\frac{1}{2}$ inches of 5 pounds per foot. Yellowpine wedges to be driven in the openings between the pipes. Chocks of yellow pine, shaped as shown on the plan, by 6 inches thick will be fitted to the outside plating through which the pipes will pass, to have an angle-bar 3 x 3 inches of 7 pounds per foot worked around the outer edge connecting same to the plating; the under side of this chock to be well coated with a mixture of white and red lead before being secured in place.

The pipes to be fitted with all necessary plugs, blind, and riding-bucklers, buckler-bars, &c., also bucklers to be fitted and hinged on the outside. The bucklers and buckler-bars to be

stowed as directed.

STERN-PIPES.

There will be two stern pipes located as shown on the plans, diameter in the clear of the casting about 12 inches each; to be built similarly in all respects as required for the hawse-pipes; the wood-chock on outside of plating to be about 4 inches thick.



FREEING-PORTS IN GUN SPONSONS.

To be in number and location as shown on the plans; size in the clear on the outside, 36 inches long by 18 inches high; fitted with shutters on the outside same thickness as the plating, and hinged on upper side, also fitted to fasten on the inside. The hinges to be made of brass.

CABLE-BITTS.

There will be two pair of riding-bitts on the fore part of gun-deck, located as shown on the plans. To be of cast-steel of approved quality, and in height 3 feet 6 inches above top of plating by 24 inches outside diameter. The castings to be in thickness at the thickest part, $2\frac{1}{8}$ inches at surface of deck-plating, tapering to $1\frac{1}{2}$ inches at top and bottom.

The horizontal flanges of the bitts will be neatly fitted to and secured directly to the deck-plating. The lower part of the bitt will extend down to a horizontal plate secured to the under side of the deck-beams, to which it will be fitted and have 4 x 4 inches of 12 pounds per foot angle-steels worked around to complete the connections. This plate to be 15 pounds per square foot; the nuts for holding the bolts securing the bits will set up on this plate, which is to be filled in solid with yellow pine between it and the deck-plating for the bolts to pass through. To have not less than six 15/8-inch bolts to each bit, and fitted with countersunk heads trimmed flush on upper side.

WARPING OR TOWING-BITTS.

There will be two pair of double-headed bitts located as shown on plan of poop and top-gallant forecastle-deck. Those on the poop to be of brass and the others of cast-steel; to have wood bed-pieces fitted under the bitts or thicker deck-planks, and the fastenings to pass through and set up on the lower side of stringer-plates.



RING-BOLTS IN DECK.

Forward of windlass in wake of chain-cables, to be of approved size and number, located where required, and fastened to the beams and deck-plates in a substantial manner.

ANCHOR-DAVITS.

There are to be two anchor-davits of the best wrought iron, one on each side, in diameter 9 inches, located as shown on plans, with the necessary eyes for cat-blocks and guys, neatly forged.

BILL-BOARDS.

To be built and fitted as shown on plan, with all the necessary triggers, eye-bolts, etc., for stowing, securing, and letting go the anchors.

SECURING-BOLTS.

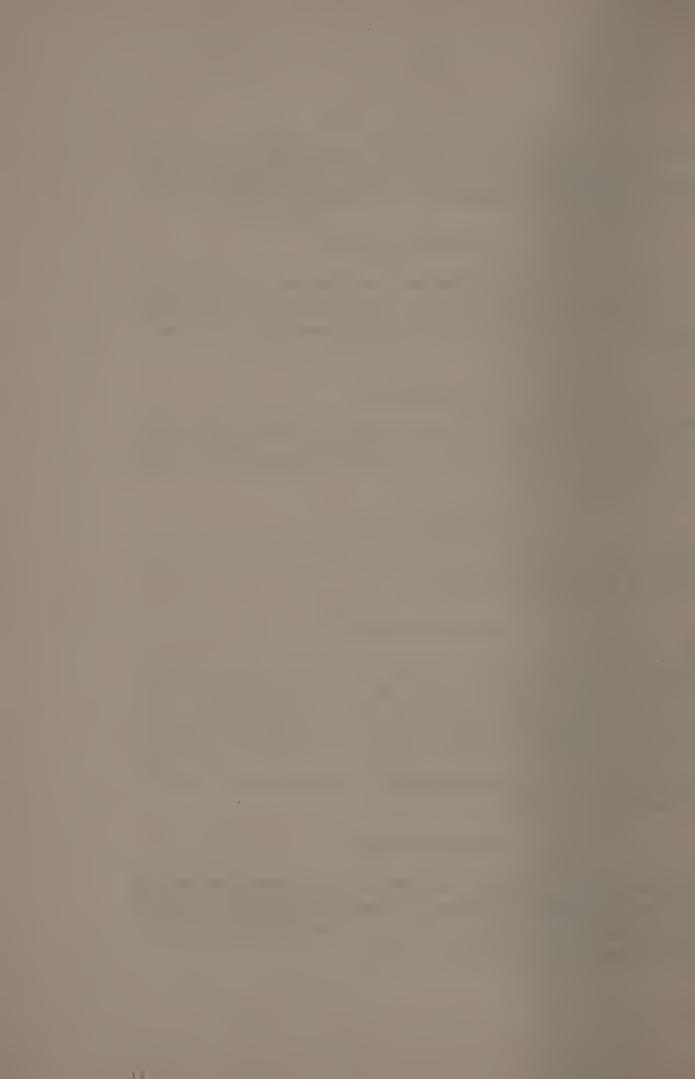
Bolts and shackles for properly securing the guns to be made and fitted where directed.

MAST-PARTNERS.

To be formed as tubes, the plates to be 15 pounds per square foot, and secured by angle-rings $4\frac{1}{2} \times 3$ inches of 9 pounds per square foot to the plating on top of beams, and 3×3 inches of 7 pounds per square foot to the plating on bottom of beams, the spaces between the plates to be filled in with pine, the plates to be 10 pounds per square foot, and well riveted to the beams as per plan.

WINDLASS-BED.

To be formed of plates 15 pounds per square foot on top and bottom of beams, the space between the plates to be filled in solid with yellow pine; to be well riveted to the beams and stiffened by angle-bars where required.



COFFER-DAMS.

The easings between the protective and berth-decks forming coffer-dams to the engine and fire-room hatches, excepting where they are formed by continuous fore-and-aft bulkheads to be of plate $12\frac{1}{2}$ pounds per square foot abreast berth deck beams, and 10 pounds per square foot below.

These coffer-dams will be carried up to a height of 6 inches above the berth deck plank, and made water-tight throughout; a half round bar to be worked all around the outer upper edge 2 x 1 inches, also angle bars on the inside 2 x 2 inches, of

4 pounds per foot, to take the adjustable wood covers.

Coffer-dams to the magazine, shell-room, and torpedo-room, excepting where they are formed by continuous fore-and-aft or athwart-ship bulkheads, to be of plate $7\frac{1}{2}$ pounds per square foot, stiffened by angle bars 3×2 inches, of 4 pounds per foot. These coffer-dams are carried up to berth deck and made water-tight throughout.

DRAINAGE AND PUMPING ARRANGEMENTS.

The drainage and pumping arrangements to be as indicated

in the following description:

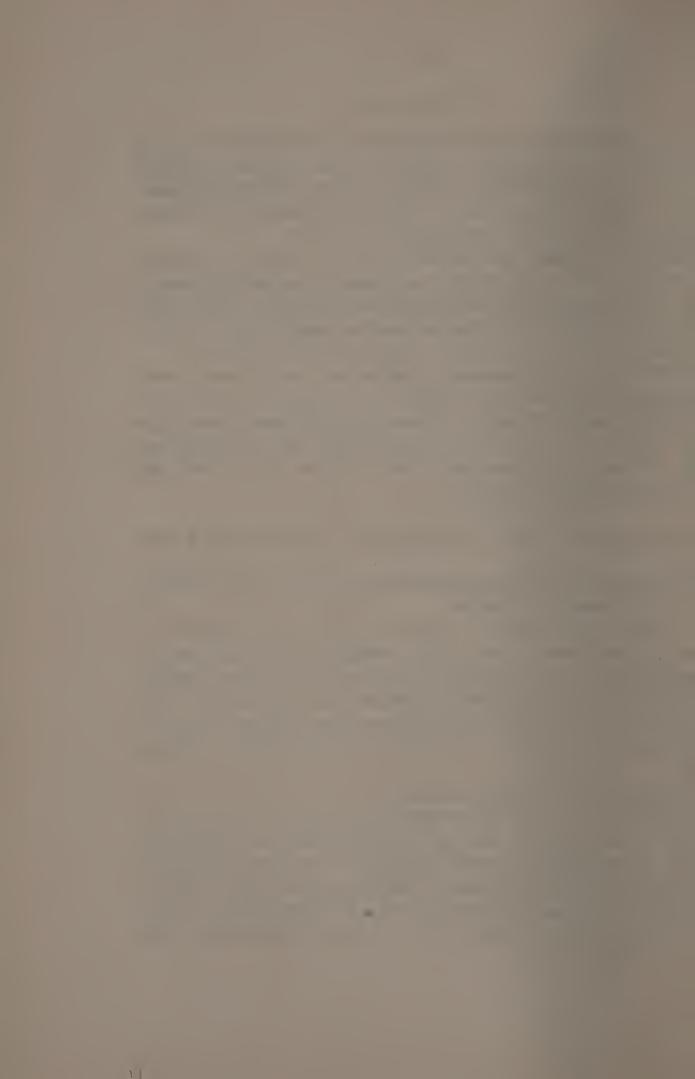
A main drain-pipe 11 inches in the clear in diameter, of iron, not less than $\frac{1}{8}$ inch thick, carefully galvanized, and in short lengths, to run between the inner and outer bottoms parallel to and at a sufficient distance from the vertical keel, to clear the web-plates of the transverse frames; to extend throughout the length of the double bottom on the starboard side.

To have the following openings:

1st. At its forward extremity in frame 31 to be closed by a sluice-valve which can be worked from the berth-deck.

2d. Immediately forward of frame 34 a cistern and pipe is to be worked between the inner bottom and the main drain, its lower part opening into the main drain; in this cistern a nonreturn or self-acting valve is to be fitted, which will allow

7. [2240]



water to run freely from the compartment above the inner bottom to the drain, but will not allow it to return; at the inner bottom the ordinary stop-valve to be fitted and worked by a rod leading to the berth-deck, and so fitted as to indicate there whether the valve is open or shut. The rod to work as close to the bulkhead as possible. In all valves leading to this drain, care should be taken to preserve as nearly as possible the same area as that of the pipe.

3d. Forward of bulkhead between frames 45 and 46 the

same as number two.

4th. Forward of bulkhead between frames 60 and 61 the same as number two.

5th. To open into the cistern under forward engine-room as

shown on the plans.

6th. Forward of bulkhead between frames 67 and 68 the same as number two.

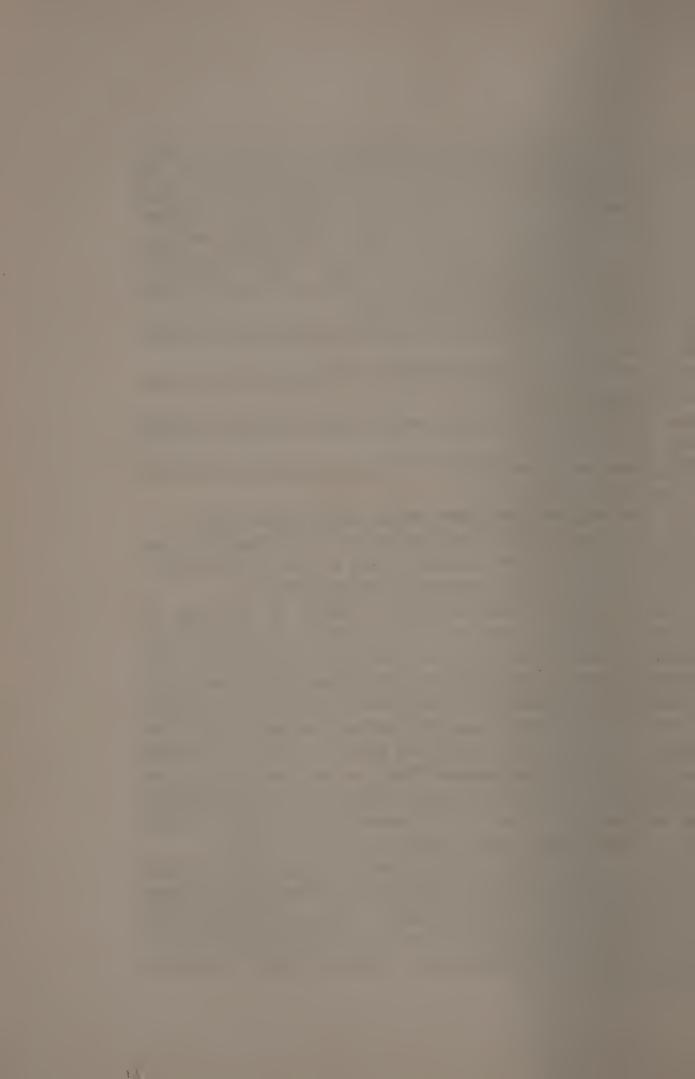
7th. To open into the cistern under after engine-room.

8th. A sluice-valve on the after side of bulkhead on frame 74 will be fitted to open into the cistern in after engine-room, the rod to lead to and be worked from berth-deck.

A second drain or suction-pipe, 11 inches in the clear in diameter, similarly constructed to the main drain-pipe, is to be fitted in the double bottom on the port side of the vessel, having a large sluice-valve leading from each engine and boiler-room, as indicated on the plans, the non-return valves in the openings leading from the compartments above the double bottom to be omitted. The pipe to be provided mainly to allow the water to pass directly from any one of these compartments to the circulating-pumps of the main engines. Sluice-valves will be fitted at the extremities of this pipe, as shown on the plans, and just before and abaft the cisterns under the engine-rooms.

The main and secondary drain-pipes to be so arranged that the water entering them will run to the cisterns under the engine-rooms at the ship's normal trim. The main suction will connect to the cistern under the forward engine-room by a 12-inch pipe passing through the vertical keel and containing

a sluice-valve.



Suctions from the circulating-pumps, a donkey and a hand-pump, will be made to each cistern.

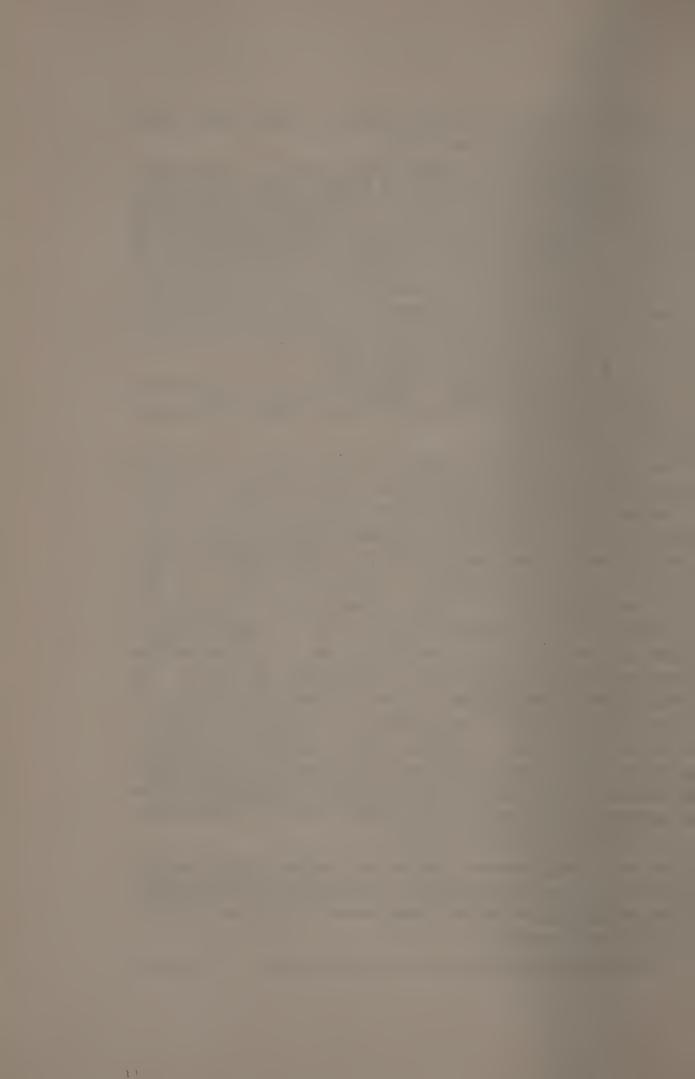
For pumping out the double bottom stand-pipes with valves for the hand-pump suctions will be fitted to each compartment, the lower end to be as low down as possible and protected by a strainer. Forward of frame 40 these stand-pipe valves will be worked from the forward fire-room. Between frames 40 and 54 the valves will be worked from the second fire-room. Between frames 54 and 67 the valves will be worked from the after fire-room. From 67 aft the valves will be worked from accessible parts of the after engine-room.

All transverse water-tight bulkheads forward and abaft of the double bottom are to have one 12-inch sluice-valve opened from the berth-deck.

The wing coal-bunkers above protective-deck to be drained by means of a 4-inch in the clear galvanized wrought-iron pipe and brass cocks, secured to the under side of protective-deck plating at the lowest place in each compartment, the openings of the pipes into the compartments to be protected by double or single strainers of approved pattern. Forward of frame 46 these 4-inch pipes will unite in one 8-inch in the clear galvanized wrought-iron pipe on each side of the vessel. Between frames 46 and 58 the 4-inch pipe will unite in one 7-inch in the clear galvanized wrought-iron pipe on each side of the vessel. Between frames 58 and 66 and 66 and 74 the 4-inch pipes will unite in 6-inch in the clear galvanized wrought-iron pipes on each side of the vessel. These main pipes will run down to the inner bottom and secure to the fore-and-aft coal-bunker bulkheads. At these points sluice-valves will be fitted to allow the water to be discharged on the inner bottom. These valves to be worked from the fire-rooms.

The wing coal-bunkers below the protective-deck will be drained by sluice-valves to allow the water to run to the drain-valves amidships, the valves being worked from accessible portions of the fire-rooms.

The valves on under side of protective-deck to be worked



from suitable places on berth-deck, and so arranged as to indi-

cate there when open or shut.

At the lowest place in each boiler-room will be placed a cistern equivalent to 14 x 14 x 14 inches; into these cisterns will be led suction-pipes from the fire-room pumps, in order to drain the leakage from ash-pits, &c.; these cisterns will be protected by strainers of approved pattern.

PUMPS.

The following hand-pumps, with connections specified, will be required for removing ordinary surface water, flooding and emptying the double-bottom compartments, and for domestic purposes. They are to be of the Calkins' pattern, 7 inches diameter of pump, except the fresh-water pump.

Pump No. 1, suction as follows:

Fresh-water hand-pump of approved capacity.

Suction 1. Distiller-tank.

Suction 2. Cock on each side to draw from dock or waterboat; delivers to fresh-water tanks forward by a hose.

Pump No. 2, suction as follows:

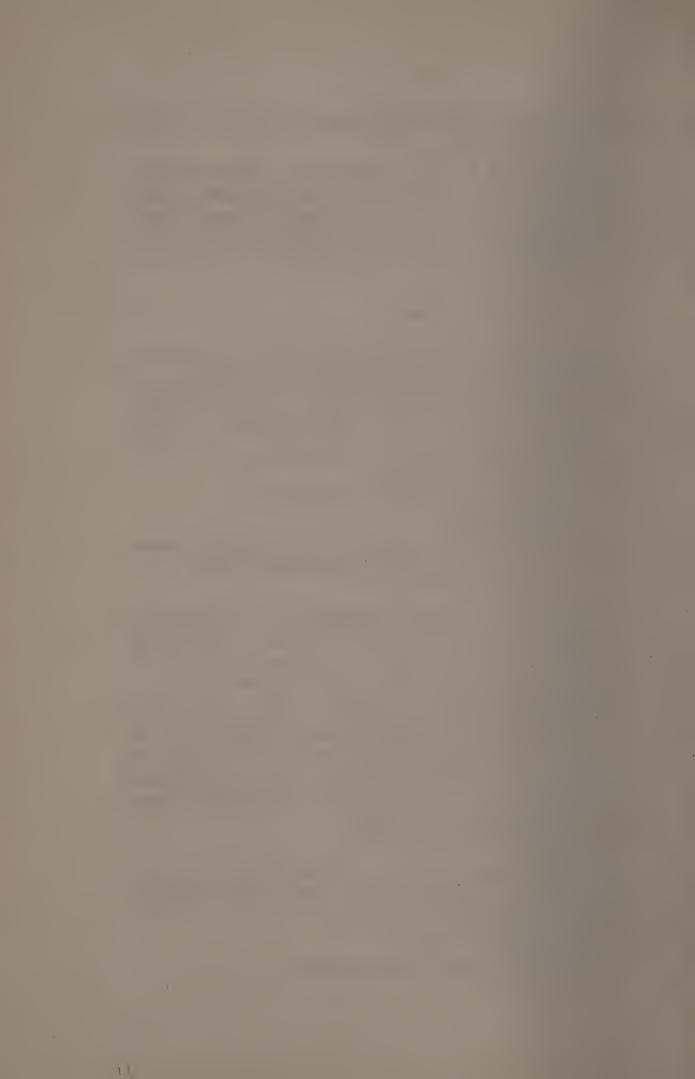
1. From the sea-cock located immediately aft bulkhead on frame 34. From this sea-cock 3 pipes should continue, each having a valve as near as possible to the sea-cock; the rods to be so arranged as to be worked from the berth-deck, one of these to be a pump-suction; a second to lead to the series of stand-pipes for filling the double-bottom and flushing the main drain; the third to be a flushing-main to the magazine, fixed-ammunition, shell, and torpedo-head room. There should also be a lock-valve in the main as near as possible to each compartment to which the main leads.

2. To the bilge suction forward of frame 22.

The pump to be worked on the berth-deck; the dischargepipe to lead under the gun-deck beams over to a scupper-pipe on the port side, also into the fire-main.

Pump No. 3, suction as follows:

1. Sea and stand-pipe in double bottom.



2. To cistern under forward engine-room.

3. To valves aft of frame 44.

The sea-cock will be a nozzle projecting from the main injection-valve in the after engine-room; from this cock will lead flushing and flooding-pipes similar to those leading from the forward sea-cock. The discharge-pipes to lead under the gun-deck over to a scupper on the port side, also into the firemain.

Pump No. 4, suction as follows:

1. Sea-cock and stand-pipe in double bottom.

2. To cistern under after engine-room. To deliver in similar manner to No. 3.

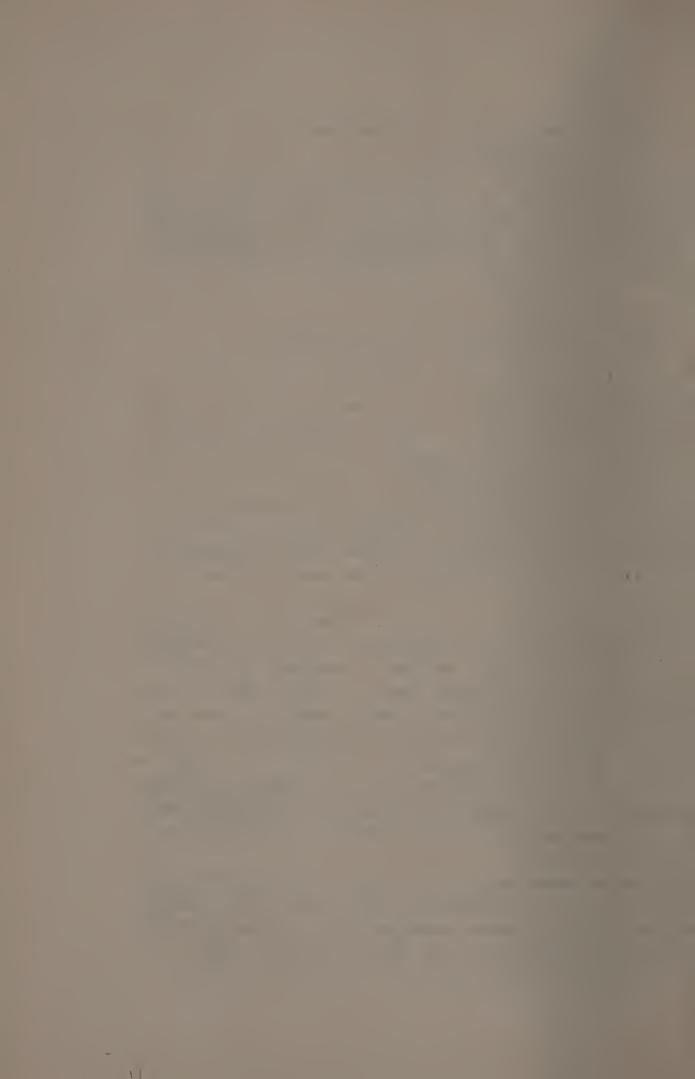
Water-tight flats should also be fitted with screw drainvalves to the bilge. Zinc or other protectors to be fitted to the Kingston valves and fastened to the plating with gunmetal screws, as will be directed.

All the pumps to be fitted complete for extinguishing fire, the rising mains to be connected to the fire-main, with wash-deck arrangements where required, with all necessary Kingston and other valves, cocks, stand-pipes, unions, and all other fittings

complete.

For salt water there are to be 10 lift-pumps, viz: two forward of seamen's head, water-closets, &c., four amidships, one to supply the galley for wash purposes, the others to supply firemen's wash-rooms; one to supply officers' water-closets aft; one to supply the steerage wash-room; one aft to supply the admiral's and captain's lavatory, and one in the sick-bay. A $4\frac{1}{2}$ -inch lift-pump to be fitted for the supply of fresh water, to be completed with all the necessary pipes and stop-cocks for the supply of the galley, daily supply tanks, &c., the pipes and barrel of the fresh-water service-pump to be thoroughly tinned.

All pumps, pipes, valves, and cocks and other fittings, lift-pumps, cisterns to water-closets, deck-tanks, galley, seamen's head, firemen's wash-rooms, lavatories, &c., to be supplied and fitted by the contractor. All copper and other pipes to be cased as required. The gearing for working the pumps to be



on the most approved plan, and to be marked and stowed as directed. The roses of all bilge-suctions and injection-pipes are not to be made of copper but of zinc, or zincked or enameled iron, or other approved material.

All necessary eye-bolts, valves in decks, &c., are to be fitted for drawing the boxes of the pumps, also all spare gear, lockers for stowing spare gear, to be provided and fitted where directed.

Great care is to be taken that no copper, brass, or gun-metal is introduced in any part of the ship so low as to come in contact with the bilge-water which may be in the ship.

The pipes for flushing the water-closets will be so arranged and of sufficient diameter that a steady stream may be kept running through them while the main engines are in motion; the connection with the circulating-engines will be arranged by the engineers. The discharge from the lift-pumps in the closets will connect with these pipes so that the closets may be flushed when the engines are not in motion.

All spare gear and reels for stowing hose to be fitted where directed. The hose to be supplied by the Government, but all pipes, cocks, &c., are to be made to receive the hose. Large sluice-valves to be fitted to the bulkheads in the engine and boiler-rooms, and to any of the remaining bulkheads if directed. Socket-levers are to be fitted for opening and shutting the valves or cocks; to be stowed near their work, the plates on the deck for indicating the position of the valves or cocks and whether they are open or shut to be marked in large sunken letters in a legible manner.

Sluice and other valves necessary for draining the several compartments, water-tight flats, engine and shaft-bearers, &c., to be fitted as directed.

Sounding-tubes to be provided and fitted as directed by the

superintending constructor.

There will be a fire-main 4 inches in diameter, running underneath the gun-deck beams, as shown on the gun-deck plan, rising at the extremities to the poop and forecastle decks;



to be fitted with all necessary valves, unions, plugs, &c., for fire and wash-deck purposes.

All cocks, sluice and stop-valves used in carrying out this

system of drainage to be of brass.

A plan embodying the above features of the drainage and pumping system to be submitted to the Chief Constructor for approval before the work is taken in hand.

VENTILATION.

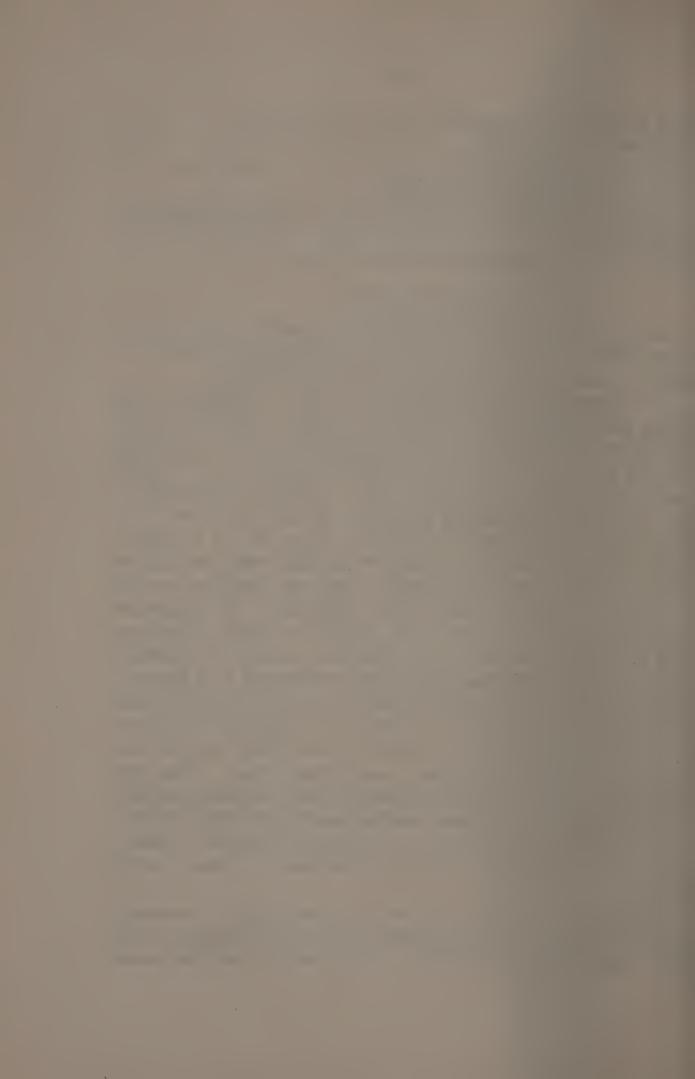
The ventilation of living and other spaces to be on the exhaust system, and separate entirely from the blowers placed in

the fire-rooms by the engineers for forced draught.

It is desirable to have recourse to natural ventilation of the living and other spaces as much as possible; artificial exhaust will be provided for all compartments below the main deck; for this purpose two blowers of the Sturtevant type, of 10,000 cubic feet capacity per minute, will be placed on each side of the berth-deck amidships, as shown on the plans, and to be so arranged by means of reversible valves, &c., as to exhaust from or force air to the several parts of the vessel, and deliver into the lower parts of the engine-rooms or into the open air.

The main pipes or ducts to be located on the protective-deck on each side to be 27 x 15 inches and made of galvanized iron, and to extend for the distance necessary; the branch pipes or ducts to be also galvanized iron from 4 to 6 inches in diameter, and to lead from the main ducts to the various rooms or compartments as may be required. Openings in pipes to be bell-mouthed, covered with wire gauze and registers with openings equal to twice the area of the pipes. Where the bulkheads, decks, or flats are pierced by the ventilating or other pipes, all approved means must be used to prevent the flow of water from one compartment to another, automatic valves to be fitted where required for this purpose, as shown on the plans.

Brass louvres are to be fitted in the top sides in connection with iron pipes leading up from below, the louvres to have light bars and covers to slide over the same to keep out water;



louvres are also to be fitted in the ceiling between decks. Efficient means will be taken to prevent the ventilation of the hold-spaces into the living spaces by means of these louvres. An air-tight bottom is to be fitted directly under each of these louvres, so as to cut off all connection between the living spaces and the hold, &c.

Ventilating-tubes, both horizontal and vertical, to be fitted and led wherever directed for ventilating the hold store-rooms, &c., and completed with the uecessary casings, louvres, and

cowls.

All cowls, air-casings, pipes, trunks, &c., for ventilating the vessel, including the downcast trunks or ventilators to the fans, also all fans, to be made and fitted complete; all cowls from main deck to top to be made of copper and specially fitted with wheel-gearing, so that they may be easily turned round to the wind.

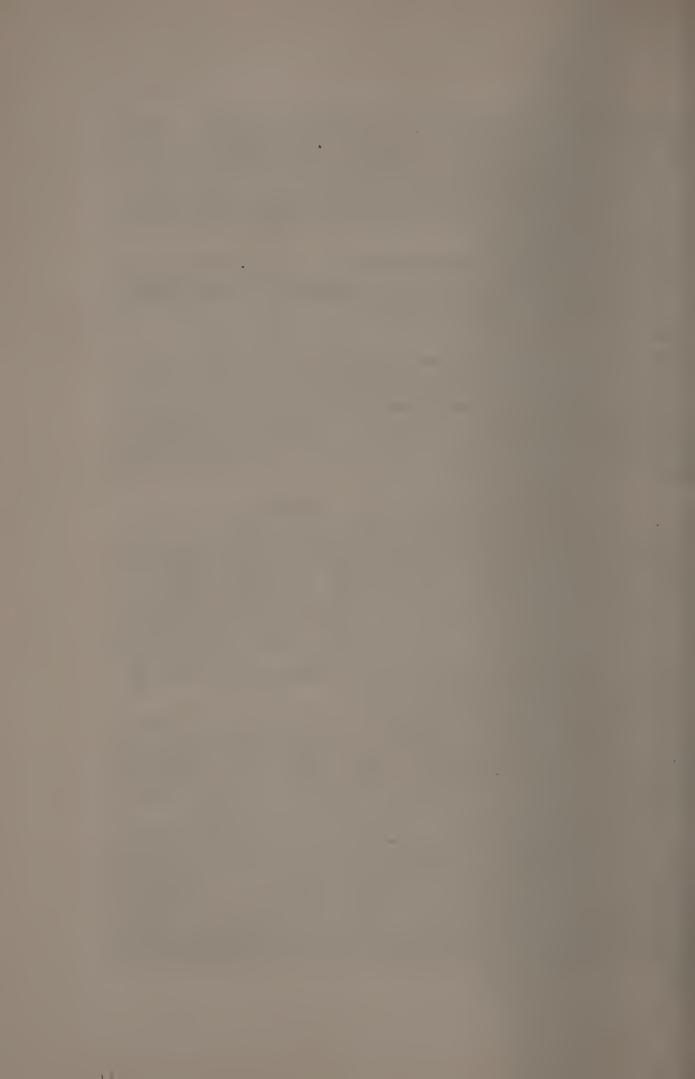
VENTILATION OF COAL BUNKERS.

To carry off any gases which may be generated in the coalbunkers, a trunk or pipe will extend for the length taken up by the coal-bunkers and be secured to and just under the berth-deck beams and close to the fore and after bulkhead, one end of each trunk terminating in the smoke-pipes to create an exhaust-draught. That portion within the midship part to be placed between the beams so as to not obstruct the room or lessen the stowage capacity.

All turns or elbows in this trunk, as well as in all other tubes or pipes for like purposes, to have easy curves; no sharp bends will be allowed. This trunk to be made of 3-pound galvanized-iron plate, size in clear 17 inches wide by

10 inches deep, riveted together and made water-tight.

The inlet or opening from each upper bunker into the trunk to be placed, as far as practicable, always at the end of the bunker opposite the inlet for fresh-air supply, to be hereafter mentioned; the inlet into trunk to have an area, in each case, equal to the area of the trunk, clear of any gratings or bars that may be placed over the inlet to prevent the admission of coal.



A butterfly-valve to be fitted in the trunk at the inlet from each of the upper bunkers so as to enable any one bunker to be isolated, if found necessary, without interfering with the ventilation of the remaining bunkers. The valve-stems to extend up through the berth-deck (with a plate let in flush with the top of the deck-plank), and to be operated on this deck by means of a key or handle, and to indicate on the plates

whether the valve is open or closed.

Galvanized wrought-iron pipes about $\frac{1}{8}$ inch thick and 6 inches in diameter will be fitted to extend from the lower bunkers up to, and from upper side bunkers into the trunk, the lower ends to be bell-mouthed, the area of the mouth and the hole in the bulkhead to be equal to twice the area of the pipe exclusive of the bars or gratings; the lower pipes to be connected to the fore-and-aft bulkhead back of boilers, &c., as close to the under side of the protective-deck as possible, passing up through this deck within the midship bunker and connecting to the trunk under the berth-deck beams. Where these pass through the armored deck and connect to the bulkhead and trunk to have $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{4}$ inch angle-steels worke around and made water-tight; the portion of these pipes within the upper bunkers to be firmly attached to the bulkheads by means of iron straps.

That portion of the beams or any other athwart-ship deckframing, &c., within the bunkers, to have holes punched or drilled in their webs as near the top as possible, to prevent the accumulation of gas between them; each hole to have an area of not less than 1 square inch and spaced about 6 inches

apart, if directed.

FRESH-AIR SUPPLY-PIPES TO BUNKERS.

To be of galvanized wrought-iron or steel pipes, $\frac{3}{32}$ inch thick by $4\frac{1}{2}$ inches diameter, the upper ends of all these pipes to be located in the hammock-berthing as high above the gundeck plank as possible; all to have large bell-mouths to admit of a free flow of air from the gundeck; no shutters or valves to be fitted, but left open with bars across the mouths; the



area, exclusive of the bars, to be fully twice the area of the pipes. All these pipes to extend down between the frames of the vessel and to be firmly attached to the outside plating or frames, as may be most convenient; those to the upper bunker passing through the berth-deck stringer-plate only; those to the lower continuing down through the protective-deck armor.

These pipes, as far as practicable, to be located at the ends of the bunkers opposite the inlet for the escape of gas in the trunk, and where they pass through the decks, &c., to have $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{4}$ inch angle-steels worked around and made water-

tight.

Where rods, valve-stems, &c., pass through bulkheads or decks, to be fitted with stuffing-boxes and made water-tight.

FORCED DRAUGHT IN FIRE-ROOMS.

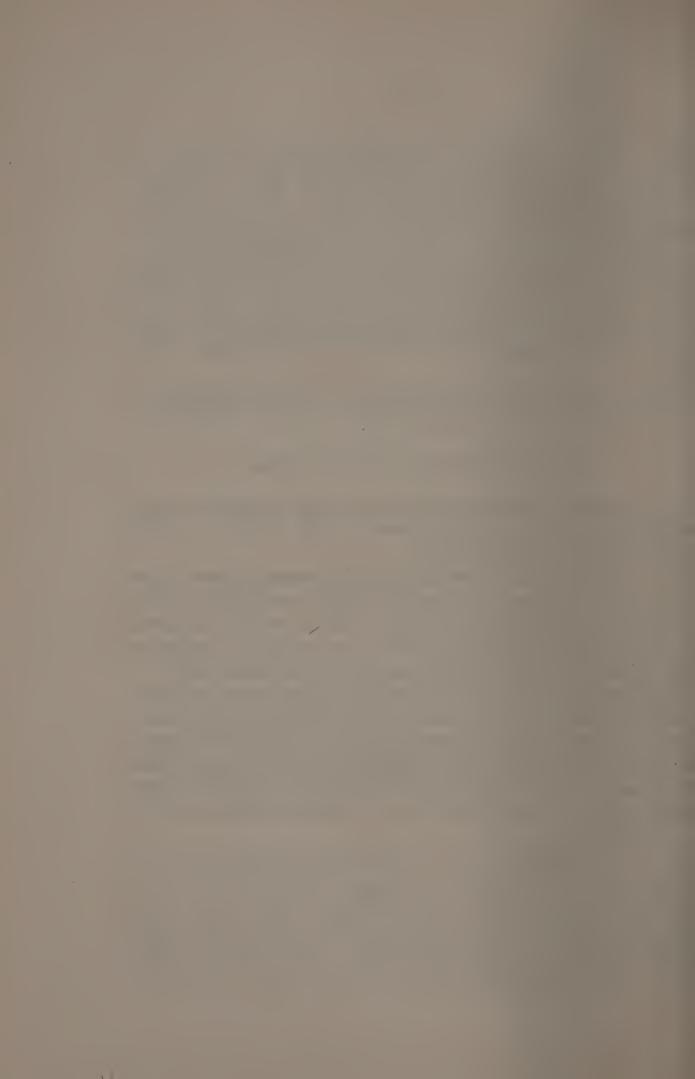
Arrangements are to be made for closing in the fire-rooms air-tight, in addition to the galvanized-iron shields provided

in the machinery specifications:

1st. At each of the entrances to the fire-rooms, where shown on the plans, as may be directed, double doors (air-lock) will be fitted. In each of these doors an air-valve will be fitted; this valve and the fastenings of the doors to be so arranged as to be opened and closed simultaneously by the same lever.

2d. Scuttles or holes in bulkheads of fire-rooms, to be fitted where directed for regulating and equalizing the pressure of air in the event of a fan breaking down or from other causes. The scuttles to be fitted with water-tight sliding covers admitting of being closed quickly from the immediate neighborhood on either side of the bulkhead, as well as from the deck above, if practicable.

3d. Small scuttles or holes in bulkheads between the two engine-rooms, also between the engine and fire-rooms, to be fitted for the purpose of communicating between these compartments. These scuttles will be fitted with water-tight plate-glass sliding covers as approved. The cover to be held up by hand on either side of the bulkhead while communica-



ting, and will close by its own weight when released, being made to work freely. A water-tight deadlight is to be fitted as a security should the glass get broken.

4th. All openings in the coal-bunkers are to have valves or other approved fittings where required, to prevent a leakage

of air from the fire-rooms when under pressure.

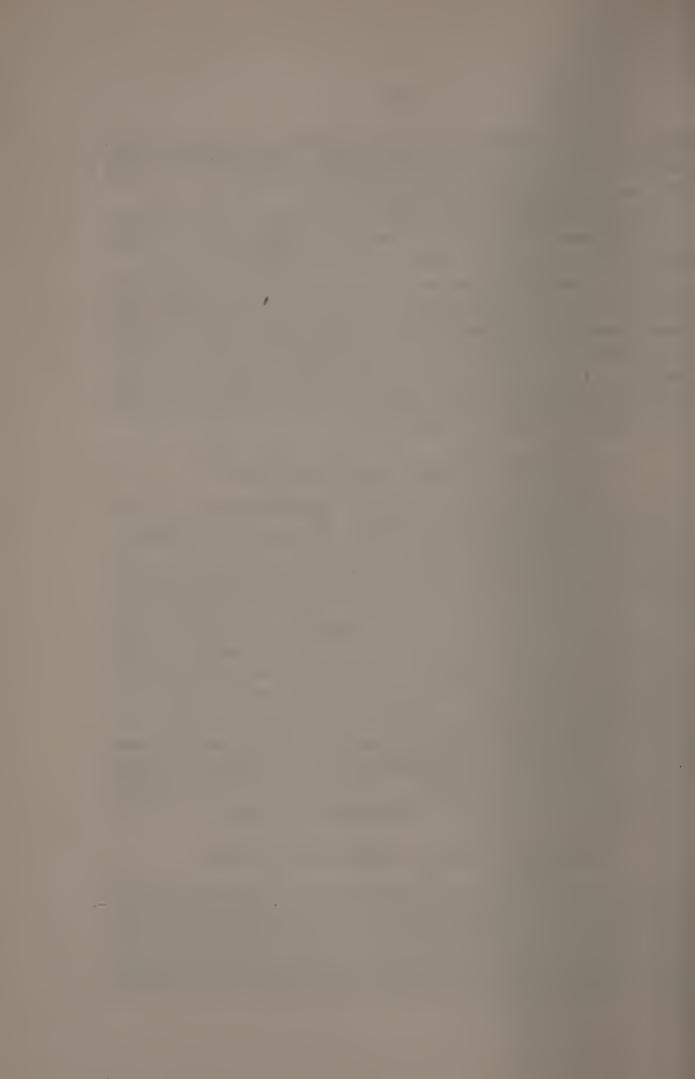
5th. The solid shutters to hatches or other openings at the protective-deck being made air-tight will provide for the forced draught so far, but in the neighborhood of the chimneys or similar openings thin covers will have to be fitted over the gratings, as may be directed, or such other precautions as may be found necessary for providing for forced draught in the fire-rooms are to be adopted.

SPEAKING-TUBES AND TELEGRAPHS.

The speaking-tubes to be made of brass, with mouth-pieces, whistles, stop-cocks, and the necessary wire-gauze diaphragms, to be fitted wherever directed; the pipes to be cased. The mouth-pieces and whistles to be of an approved pattern. Separate and direct means of communication will be established between the conning tower and all important places, including engine-rooms, torpedo-rooms and stations, all steering-wheels, main and secondary batteries, mast-head and other electric search-lights, and cabin. Direct communication will also be made between the main and secondary batteries and ammunition for same, also between all electric lights and dynamorooms, torpedo-rooms and torpedo-tubes, and pilot-house, and elsewhere as may be directed. The contractor will also provide and fit all mechanical telegraphs as directed.

CEILING IN HOLD, STORE-ROOMS, ETC.

The ceiling in hold, sail-rooms, and store-rooms, forward and aft, below the berth-deck, to be generally of yellow-pine battens, $1\frac{3}{8}$ inch thick by from 3 to 4 inches wide, and placed sufficiently far apart to admit of cleaning and painting the frames and plating behind them, and secured to the reverse

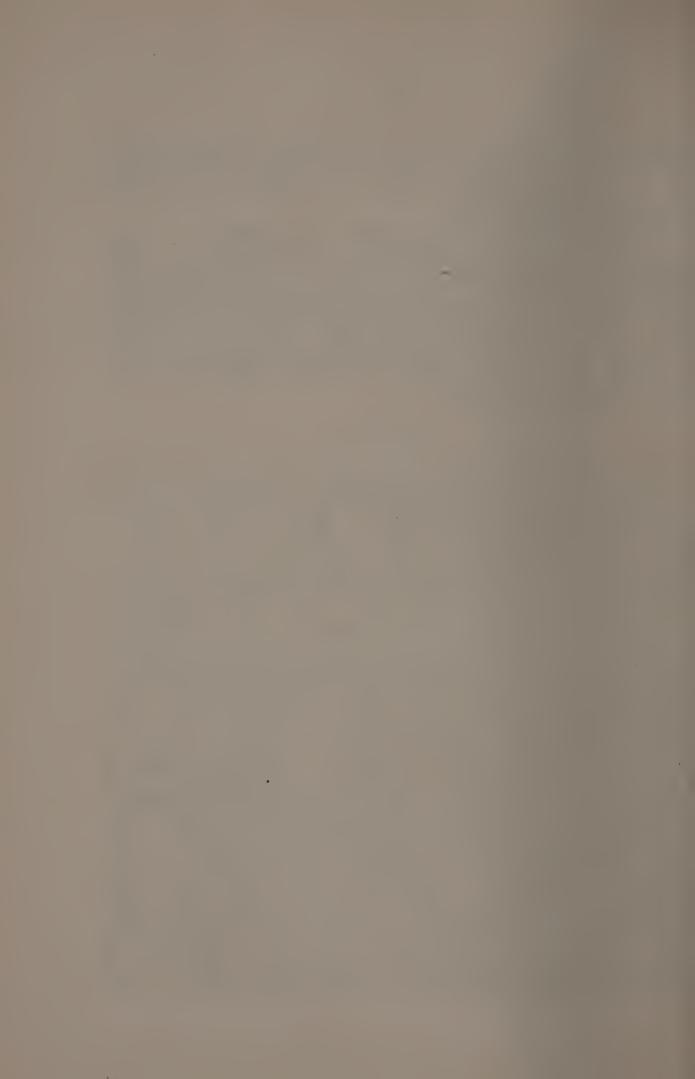


flanges of the frames by galvanized-iron screw-bolts; if required, battens to be also placed on the athwart-ship bulkhead of these rooms. There will be no ceiling to the frames within the coal-bunkers.

Ceiling on berth-beck, also under poop-deck, to be vertical steel-plates not over $2\frac{1}{2}$ pounds per square foot and in width sufficient that the edges can be secured to the reverse-flanges of the frames and the ends, &c., by steel-bars $\frac{7}{8} \times \frac{1}{4}$ inch per foot, secured by $\frac{1}{4}$ -inch round-headed brass-screws about 5 inches apart. The plates to be so fitted as to be easily removed to admit of the frames, plating, &c., being thoroughly examined, cleaned, and painted.

WARD-ROOM.

The fore-and-aft bulkheads to state-rooms to be made of sycamore veneering about $\frac{1}{4}$ -inch thick on white pine $1\frac{3}{8}$ inches thick, dead-finished, and designed without pilasters, but with suitable moldings and panels as approved; all sections to have stationary blinds in upper part and panels below, excepting doors, which will have Venetian blinds in upper part and stationary blinds in lower part. The wood casing to steel water-tight bulkhead between ward-room and steerage will show the same finish through as the fore-and-aft bulkheads, the doors to the state-rooms in the fore-and-aft bulkheads to be made to slide inside the room, and fitted with noiseless rollers and rubber bumpers, &c., to prevent shaking; the doors in the athwart-ship bulkheads to be hinged, and metal water-tight doors between ward-room and steerage will be made to open from either side, and to remain always hung and ready for instant use; but a wood door similar in finish to the others will be fitted and hung for ordinary purposes. The bulkheads between the state-rooms to be of narrow beaded, tongued and grooved $1\frac{1}{8}$ -inch seasoned white pine. Each state-room will have a berth, the front to correspond in finish to fore-and-aft bulkheads, hinged to turn down and fitted with drawers and lockers below the berth, also lockers in the whole back part of berth, with hinged doors to same; a small



Venetian blind will be arranged in each room to close over the air-port, opening on the inside; all fittings to be complete as usual in the United States Navy. The underside of deck in the ward-room and state-rooms, &c., to be lined by means of three diagonal thicknesses of maple wood together not over $\frac{3}{16}$ inch thick, worked between the beams, as shown on the plans. The openings between the beams over the fore-and-aft bulkheads and elsewhere, as required, to be fitted with brass-wire panels. The deck-strips to be 3 inches thick, of yellow pine, and secured with brass screws.

Cot-hooks for ten persons will be arranged in the ward-room. All drawers, lockers, &c., will be fitted with locks and

duplicate keys.

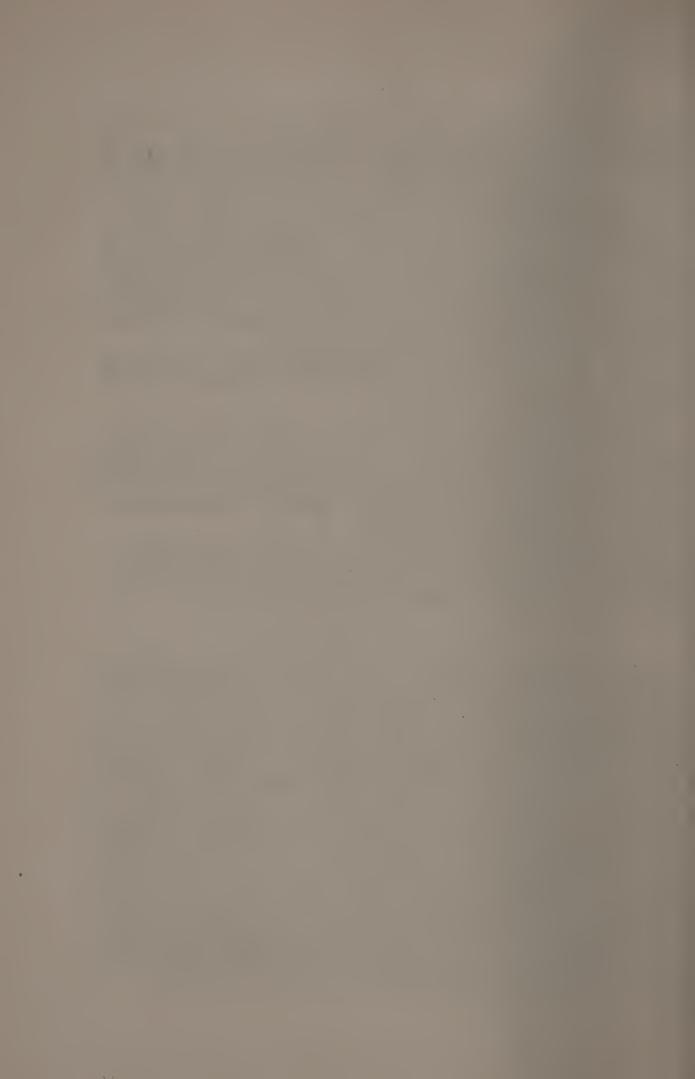
All hardware to be of the best quality, locks of brass, knobs and hinges of bronze. Provision to be made in fitting up the rooms to afford access by removable parts back of berths, lockers, &c., for examining, cleaning, and painting the frames and plating of the vessel.

The inside of the gun-supports to be fitted with shelves as directed. Locker-seats will be built as per plan, between gun-

supports and forward state-room bulkhead.

CABINS UNDER POOP-DECK.

To be finished similarly to the ward-room, as approved. The athwart-ship steel water-tight bulkhead near fore-end of poop-deck to be cased on inside with wood to show the same finish throughout as the other bulkheads of the cabin and rooms forward of the same; except the divisional internal athwart-ship bulkheads to these latter rooms, which will be of seasoned white pine 1½ inches thick, beaded, tongued and grooved; the bulkhead-door sections to be fitted with sliding glazed sash and blinds in upper part; the other sections to be paneled as approved; the metal water-tight doors in this bulkhead will be made to open from either side, and to remain always hung and ready for instant use, but a wood door similar in finish to the wood bulkhead, and fitted with sliding-sash and blinds in upper part, will be fitted and hung for or-



dinary purposes. The casings around the ward-room skylight trunks will be made solid on after-side with panels and dumbblind, as approved; the fore-side, opening to the deck, will be fitted in the upper part with hinged or sliding Venetian

blinds and glazed sash, as directed.

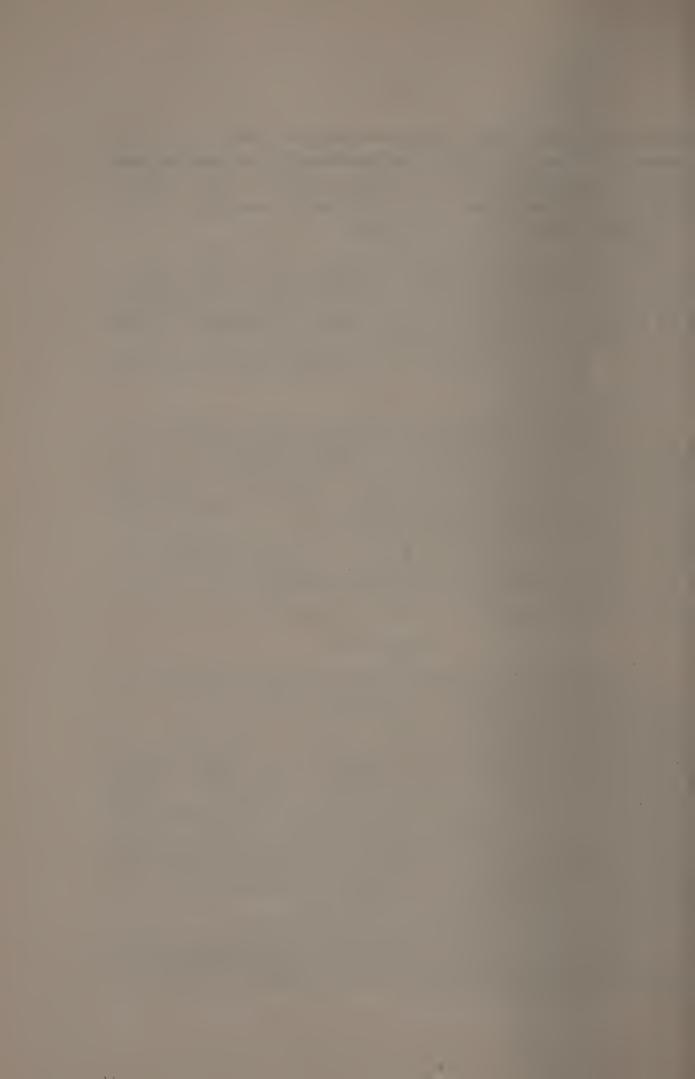
The admiral's and captain's state-rooms will be fitted up with berth, drawers, lockers, sliding-doors, &c., similar to those for the ward-room; also bronzed brass-wire panels over all bulkheads in cabin and elsewhere, as directed; the deck-strips to be $3 \times 2\frac{1}{2}$ inches yellow pine, and fastened with brass screws. The under-side of the poop-deck to be lined similar to the ward-room.

The bath-rooms and water-closets under the poop-deck to be fitted up with lockers, shelves, drawers, &c., as directed. The admiral's, captain's, and executive officer's offices to be fitted as directed. Cot-hooks as directed. All drawers, lockers, &c., will be fitted with locks and duplicate keys. All hardware to be of the best quality, locks of brass, knobs and hinges of bronze. Provision to be made in fitting up the rooms to afford access by removable parts back of berths, lockers, &c., for examining, cleaning and painting the frames and plating of the vessel.

STEERAGES.

The steerage will be provided with locker seat along the side of the vessel, as shown on the plans, fitted with one tier of drawers under same, each drawer about 3 feet long. At the fore and after ends of steerage, as shown on the plans, to be fitted with lockers the whole height between decks, drawers to be fitted at the bottom of these lockers, as directed. Above the locker-seat, between the air ports, to be also fitted with lockers, racks, or shelves, in height as may be directed, above the seat. Care being taken that the fittings can be readily removed without injury, for the purpose of examining, cleaning, and painting the plating and frames of the vessel.

The fore and aft, also athwartship bulkhead, on both sides of steerage, casings to water-tight bulkheads, underside of gundeck, and all doors, hardware, &c., including also metal water-



tight doors in water-tight bulkheads on each side forward of steerage, to be made and fitted as required for the ward-room. As many hammock hooks as can be properly arranged will be put up in the steerage, and the lockers will also be well supplied with clothes hooks with porcelain knobs.

CHRONOMETER AND COMPASS LOCKERS.

To be located where shown on the plans and fitted up with shelves and boxes, as may be directed.

SAIL-ROOM.

To be battened all around and fitted on the floor with gratings, as directed; also lignumvitæ rollers to be fitted at the entrances. The whole steel surfaces of the room to be well coated with cork-faced paint, to prevent condensation before any woodwork is secured or put in place.

GENERAL AND STORE-ROOMS.

To be fitted complete with all bins, racks, drawers, lockers, shelves, battens between beams, permanent tables, desks, &c., as required; all to be fitted with brass locks with duplicate keys. The fittings to the ship's side to be so attached that they can be easily removed for the purpose of examining, cleaning, and painting the frames and plating of the vessel. Wherever possible the bulkheads of store-rooms are to be made of panels of No. 12 B. W. G. galvanized iron wire \(\frac{3}{4}\)-inch mesh.

PAYMASTER'S OFFICE.

To be fitted with desk, drawers, book-racks, and all necessary lockers, shelves, &c.; all fittings to be of ash.

SIGNAL LOCKERS.

To be fitted with the requisite pigeon-holes in cherry.



ARMORY.

To be located where shown on the plans, and fitted up in cherry to stow neatly 180 rifles, 50 cutlasses, and 50 revolvers.

PRISON.

Located where shown on the plans, fitted and ventilated as directed.

MASTER-AT-ARMS' LOCKER.

To be fitted with small desk and drawer, lockers, shelves, &c., as directed.

RUDDER-MOLD.

A rudder-mold to be provided, giving the correct shape and dimensions of the several parts of the rudder.

DISPENSARY.

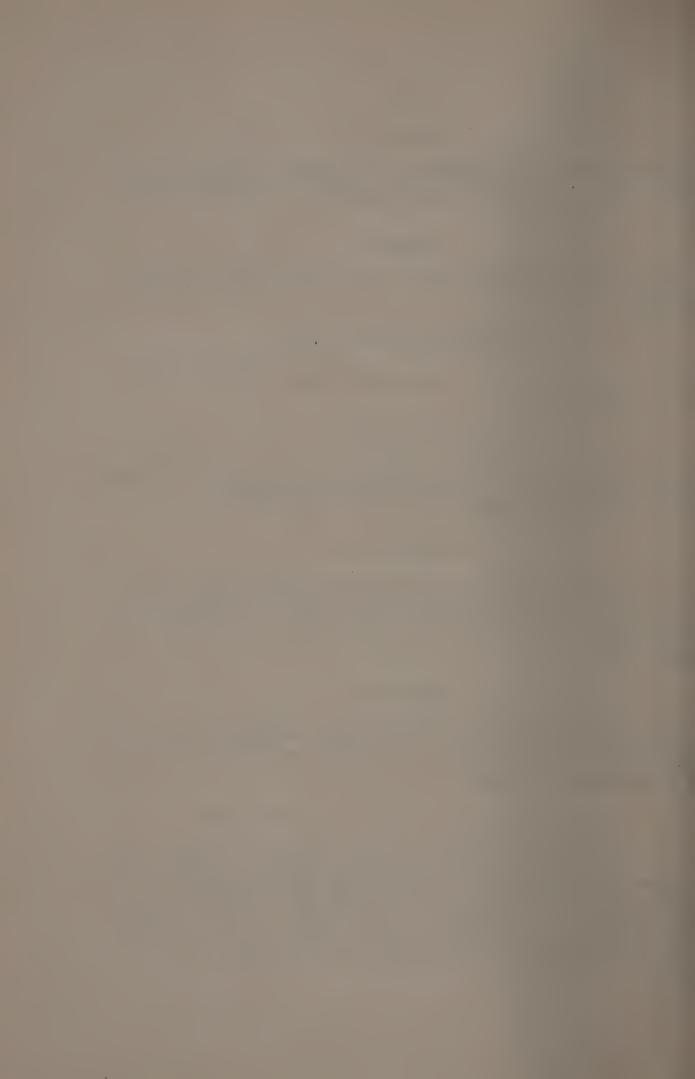
To be fitted up in ash and cherry with all necessary drawers, lockers, bottle-racks, as per sample, desk, wash-stand, and water-supply to same, with tank, stop-cocks, waste-pipe, &c., complete.

SICK-BAY.

To be provided with a full complement of hammock-hooks, also bath-tub, wash-stand, and water-closet, all to be completely fitted as required.

ENGINEERS' WORK-SHOP AND STORE-ROOM.

To be built where shown on the plans, of 8 pounds per square foot plating, and stiffened vertically by angle-bars 3 x 2½ inches of 6 pounds per foot, placed about 30 inches apart. To be fitted complete, with drawers, lockers, shelves, battens between beams, racks for spanners, vice-benches, &c., as required.



ORDNANCE WORK-SHOP.

To be built and fitted up complete in all respects as required for the engineer's work-shop.

PANTRIES.

All pantries are to be fitted in ash and cherry, with the usual lockers, drawers, bins, glass and plate-racks, shelves, hooks, iron porcelain-lined wash-sinks, water-tanks, supply and waste-pipes, cocks, ventilating-pipes, &c., complete in all respects as may be directed.

WATER-CLOSETS.

To be located where shown on the plans, the fixtures to be of the most approved kind, with all necessary fittings, tanks, gratings, &c., as required. Water-closets for crew to be built and located as shown on the plans; connections are to be made with a steam-pump for thoroughly flushing same, fitted with steam connection for cleansing. The urinals for the officers and crew are to be made of iron porcelain-lined and of an approved pattern. All water-closets and urinals to be ventilated in the most satisfactory manner, as directed.

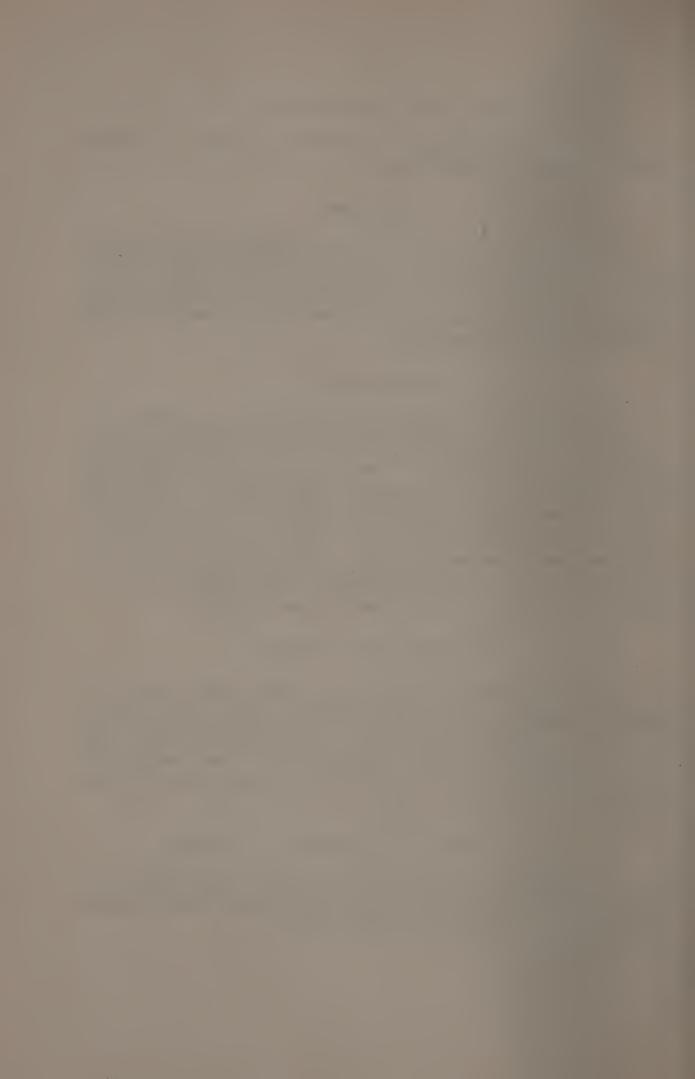
FIREMEN'S WASH-ROOMS.

To be built where shown on the plans, and fitted with basins for washing, waste-pipes, drawers, wire-lockers, clothes-hooks, &c., complete as directed. A lift-pump to each room to be provided and fitted. The steel deck to be covered with iron grating; also means to be provided to carry off the waste-water.

LAVATORIES FOR OFFICERS AND CREW.

To be located where shown on the plans, and fitted with wash-basins, supply-tanks, waste and supply-pipes, cocks, lockers, &c., complete, as may be directed.

9. [2240]



REELS.

For steel-wire and other hawsers to be fitted as directed. Also all reels for hose as required to be fitted in place.

BRASS LABEL-PLATES.

To be fitted where directed, for showing the names of the store-rooms and numbers of the state-rooms, &c., also for indicating whether sea-cocks, sluice-valves, water-tight doors, &c., are open or shut.

MESS AND CLOTHES-LOCKERS FOR CREW.

There are to be 20 mess-lockers about 18 x 18 x 40 inches, with two shelves, and 300 clothes-lockers about 20 x 20 x 18 inches. These lockers are to be made in sections of No. 12 galvanized-iron wire, one-inch mesh, and light channel-bar frames, and fitted and secured to the sides or bulkheads. Each locker to be fitted with a lock having two keys and one blank key.

EYE-BOLTS IN BEAMS.

Eye or other bolts to be secured to all beams or other framing where necessary, for the purpose of removing casks, packages, &c., and for tricing up chain-cables, as directed.

LAMP-ROOM.

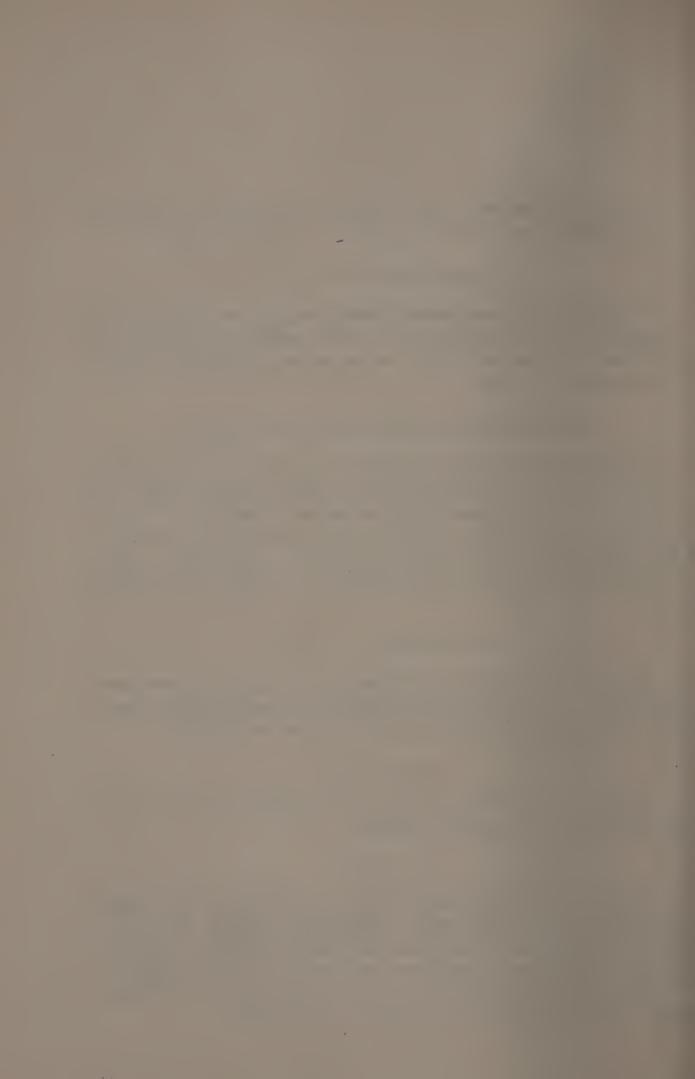
To be located where shown on the plans, and fitted with metallic shelving and wire lockers.

OHL-TANKS.

Oil-tanks are to be made of No. 14 galvanized iron, fitted with brass hand-hole cover, filling-pipe leading from main deck, brass cock with lock and key, and drip-pans, and to be legibly marked with capacity and kind of oil they contain.

The tanks for sperm-oil to have a capacity for 120 gallons

and that for linseed-oil a capacity for 60 gallons.



VARNISHING DECKS.

The forecastle, poop, and spar-decks are to be varnished or otherwise coated, as considered necessary by the superintending constructor, to protect them during the progress of the work.

FIGURES FOR DRAFT OF WATER.

To be 6 inches in height, and cut in a legible manner on stem and stern, also painted on before the vessel is launched; to be carefully laid off, and to indicate every foot from about launching draft of water to 22 feet above bottom of keel.

MACHINERY REQUIRED IN BUILDING.

All machinery, &c., of whatever kind, required in building the vessel is to be supplied by the contractor.

ELECTRIC LIGHTING APPARATUS.

There shall be an installation of electric lights on board as follows:

Plant.—Two incandescent electic-lighting plants arranged to work on the same circuit, each of which shall be in every respect a duplicate of the other. The plants shall be of the most approved pattern as regards efficiency, producing at least 125 candle-power per mechanical H. P., with an average life of 600 hours per lamp at the time, the lightest and most compact, and the best adapted for marine work of any that can be obtained in the United States at the period they are placed on board. The engines and dynamos shall rest in oiltight beds and be supplied with the necessary oil-cups, drippans, guards, hand-rails, tools, wrenches, oil-cans, feeders, and tanks.

Engines.—Each engine shall, if possible, be so arranged that it can drive either dynamo separately, or both together. They shall be of such dimensions that each can drive one dynamo while developing its full capacity, with a piston pressure of 40 pounds per square inch while exhausting into the atmosphere. They shall be fitted with condenser and

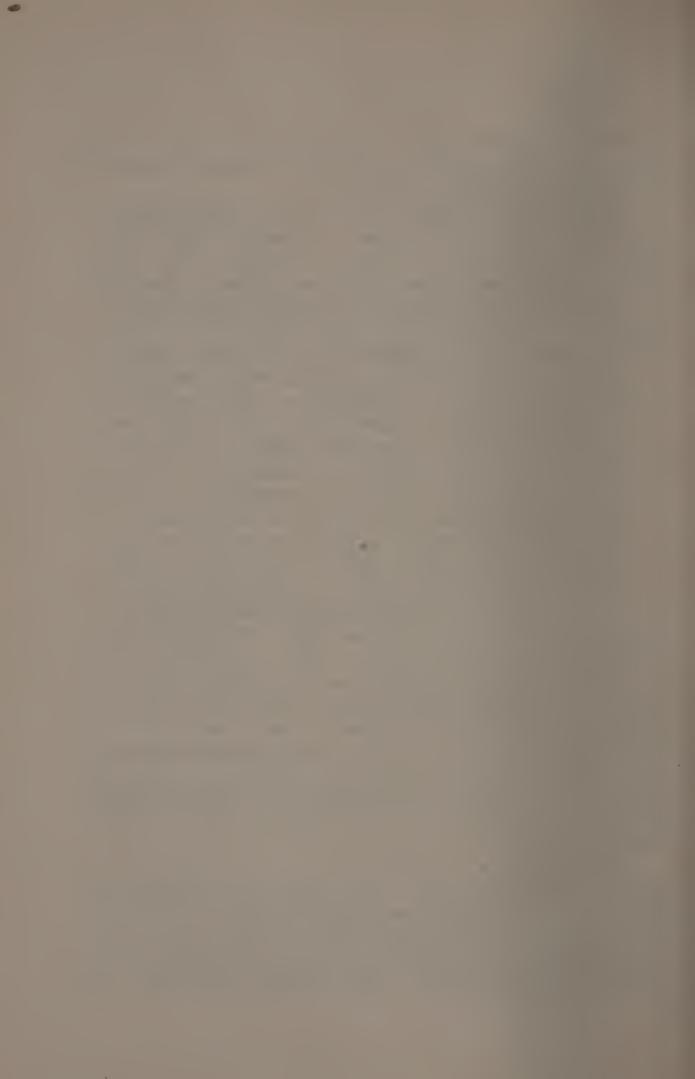
atmospheric exhaust-pipes. Valves shall be fitted to the steam-supply and exhaust-pipes so that complete control of

the engines may be had on the spot.

Dynamos.—The dynamos shall be of the same electromotive force, and each shall possess a capacity of producing at least 3,200 candle-power of light, or be able to fully supply 200 16 candle-power lamps or their equivalent. They shall be so constructed that lamps of 8, 16, and 32 candle-power, or preferably 10, 16, 32, and 50 candle-power, can be used on the same circuit, with an independent control over each lamp.

Conductors.—All conducting material except that used for wiring fixtures shall be of tinned-copper wire of not less than 96 per cent. conductivity, covered with the best rubber insulation and then inclosed in pure lead-tubing. It shall be subject to an insulation test as follows: a sample of not less than 500 feet in length shall, after having remained in salt water at least 24 hours, possess an insulation of not less than 1,000 megohms per nautical mile. It shall have a conducting area of not less than one square millimeter per every 1½ amperes of current that may pass through it. It shall, when laid about the ship, be inclosed in securely fastened wooden molding, and the exterior of any two conductors shall be separated by some insulating substance at least $\frac{1}{4}$ of an inch. The molding shall be capped, completely covering in the conductors, and both molding and capping shall be secured with brass screws and correspond in material and finish to the joiner-work in the immediate vicinity. All wire joints shall be soldered, insulated, and except those made at fixtures, inclosed in water-tight bronze junction-boxes. The openings in water-tight bulkheads for conductors shall be made water-tight by means of suitable stuffing-boxes.

Lamps.—All lamps shall be so placed, and of such power as may be required, in order to fully light up all parts of the ship, including coal-bunkers, magazines, shell and ammunition-rooms, running lights, and lights for use on the upper deck and aloft. They shall be arranged in sections not to exceed fourteen in number, so that complete control over each



section may be had by means of switches placed in the dynamoroom. Each lamp shall be supplied with a key-socket, or a keyless socket and a water-tight switch, as may be designated, and a spring to reduce the transmission of shocks. All metal parts on lamps, sockets, and switches shall be nickel-plated. The number to be about 400, with a total aggregate candle-power not to exceed 6,400 or the combined capacity of both dynamos.

Fixtures.—They shall be made of brass, nickel-plated, of the most approved form for ship use, and subject to selection.

Insulation.—The dynamos, the exterior or outer coating of all conductors, all fixtures, junction of boxes and other parts of the system shall be insulated from the ship. All junction-boxes, switches, conductors, and joints of conductors shall be water-tight. When complete, with all connections made ready for the use of each and every lamp, the insulation of the system complete, including the dynamo, shall not be less than 1,000 ohms of resistance to every volt of electromotive force of the dynamo.

Spare parts.—Such spare parts of the engines, dynamos, and other portions of the plant shall be provided as will enable it to be used for a period of three years without further supplies being received. The amount of such spare parts and supplies to be based upon the supposition that the plant will receive good and intelligent care, that one engine and dynamo will always be in operation, and that each lamp will average

in use three hours daily.

ELECTRIC CALL-BELLS.

Electric call-bells, with all necessary batteries, wires, buttons, of the best and most substantial materials; to be fitted complete throughout the ship, as directed.

HEELING SHIP.

If at any time after the ship is launched it should be deemed advisable to heel her for the purpose of ascertaining location of the center of gravity, the necessary labor and material therefor will be furnished by the contractor without extra charge.



SWINGING-TABLES AND BENCHES FOR CREW.

To be made of white ash, with galvanized-iron fittings. These tables and benches are to have a capacity for about 300 men, and to be fitted as is usual in the naval service, and stowed between the beams in convenient manner, as directed.

CLEANING, GALVANIZING, ETC.

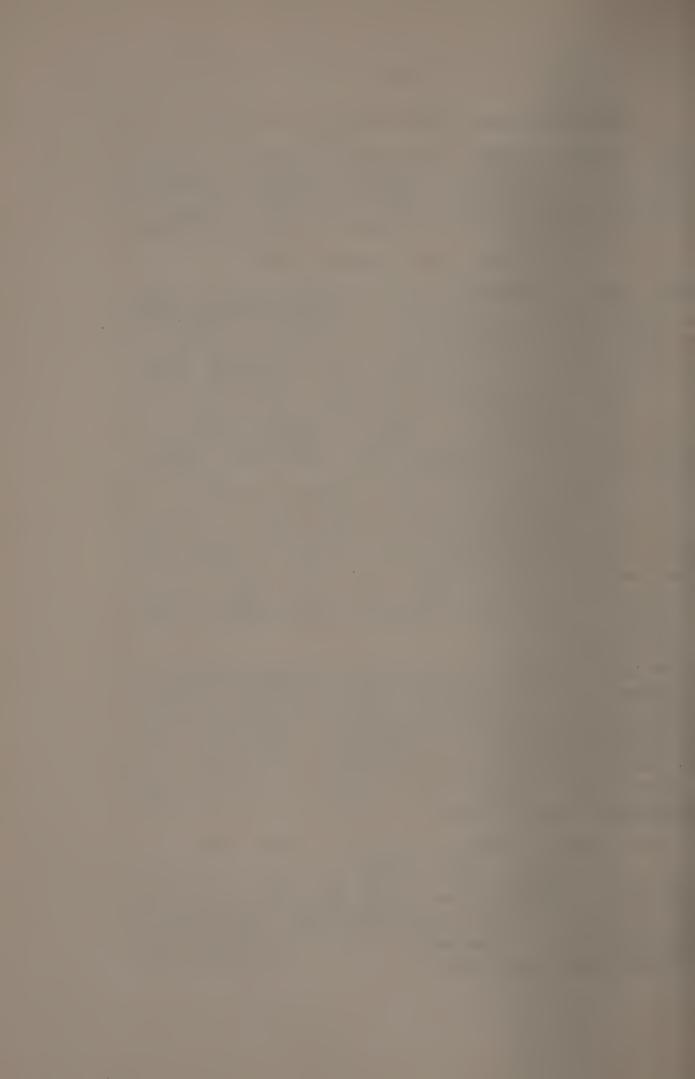
All steel and iron work is to be carefully scraped, scaled, and cleaned before being painted. The plates of the bottom, the lower plates of bulkheads, the floor-plates of frames, and other plates as may be directed, are to be treated as follows, for the purpose of removing the black oxide or scale: The plates, before being taken in hand for working, are to be immersed for a few hours in a liquid consisting of 19 parts of water and one of hydrochloric acid. The plates should be pickled on edge and not laid flat. When the plates are removed from the dilute acid, both surfaces are to be well brushed and washed to remove any scale which may still adhere to them. They should then be placed in another bath filled and kept well supplied with fresh water, and be thoroughly washed with a hose, as may be found necessary. The plates on removal from the fresh water should be placed on edge to dry.

The heels of all iron or steel awning-stanchions, guard-rail stanchions, and all gratings, eye and ring-bolts, coal-scuttle frames, lids, and gratings, rubbing-plates, armament fittings, &c., and all fastenings for wood-ceiling in hold, store-rooms, &c., the lower plates of all bulkheads in lower hold, and all such outfits exposed to the weather, to be thoroughly

galvanized as may be directed.

PAINTING AND OTHERWISE COATING STEEL, IRON, AND WOOD-WORK.

The entire inside of vessel, except that portion on berthdeck not occupied by the machinery, boilers, and coal, and under poop and forecastle-decks, is to be covered with three good coats of the best oil-paint.



The inside of plating, the frames above berth and maindecks, the deck-beams, plating, ties, stringers overhead, bulk-heads on the berth-deck in wing-passage, the fire-room and engine-room hatch-casings, ward-room and all its adjacent rooms, are to First, receive a priming-coat of red lead; second, before the wood-work of any kind is put in place a coat of white lead mixed with a proper proportion of varnish or some other adhesive substance; third, before this coating is hard there is to be applied a coating of pulverized cork as thick as possible, the cork to be of such degree of fineness as may be directed; fourth, after the paint holding the cork is hard, two coats of best white-lead paint is to be applied over the cork and finished with a coat of white china-gloss.

The object of this cork facing is to prevent radiation and condensation, and care must be taken to have every part of

metal thoroughly covered with the cork.

The exterior of the vessel above water-line is to be covered with a good coat of cement equal to Tibble's, and finished with not less than two coats of black. When the vessel is delivered all paint-work inside and out must be clean and fresh.

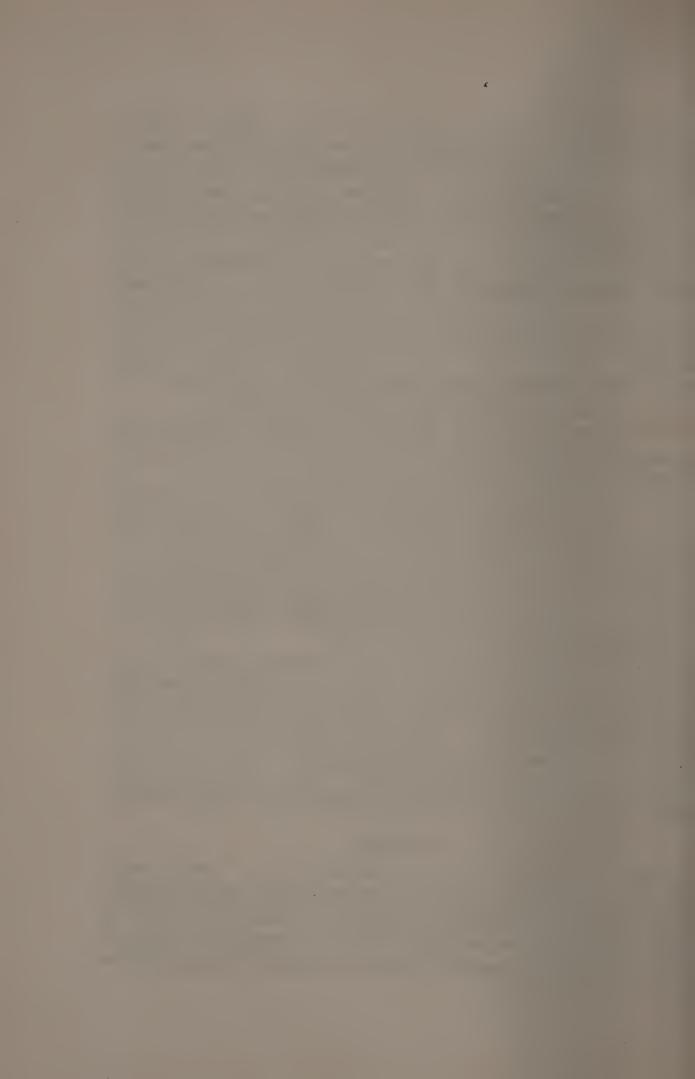
All deck-iron or steel work, including inside of hammock-nettings, outside of hatch-coamings, davits, anchor-gear, &c.,

to be cemented same as exterior of hull.

All hard woods to be dead-finished with the very best materials and in the best manner. All wood-work not polished to have three coats of the best white-lead paint and finished with white china-gloss. Where required the joints of woodwork will be put together with white lead. The bottom, from the water-line down, will be covered with the most approved anti-corrosive and anti-fouling material, as may be directed.

CALKING.

The whole of the calking in the vessel to be performed in the most satisfactory manner; if it should be considered necessary by the superintending constructor, before the vessel is delivered by the contractor to the Navy Department, to re-calk the decks, &c., and reconcile the edges, the same is to be done by



and at the expense of the contractor; and if any portion, or the whole of the calking should be found on final survey not to be done in such an efficient manner as required, the same is to be re-calked and the expense thereof deducted from the contractor's final bill.

The oakum is to be equal to that used by the Government in calking vessels of the U.S. Navy.

CLEANING DIRT, CHIPS, ETC., FROM BILGES, COMPARTMENTS, ETC.

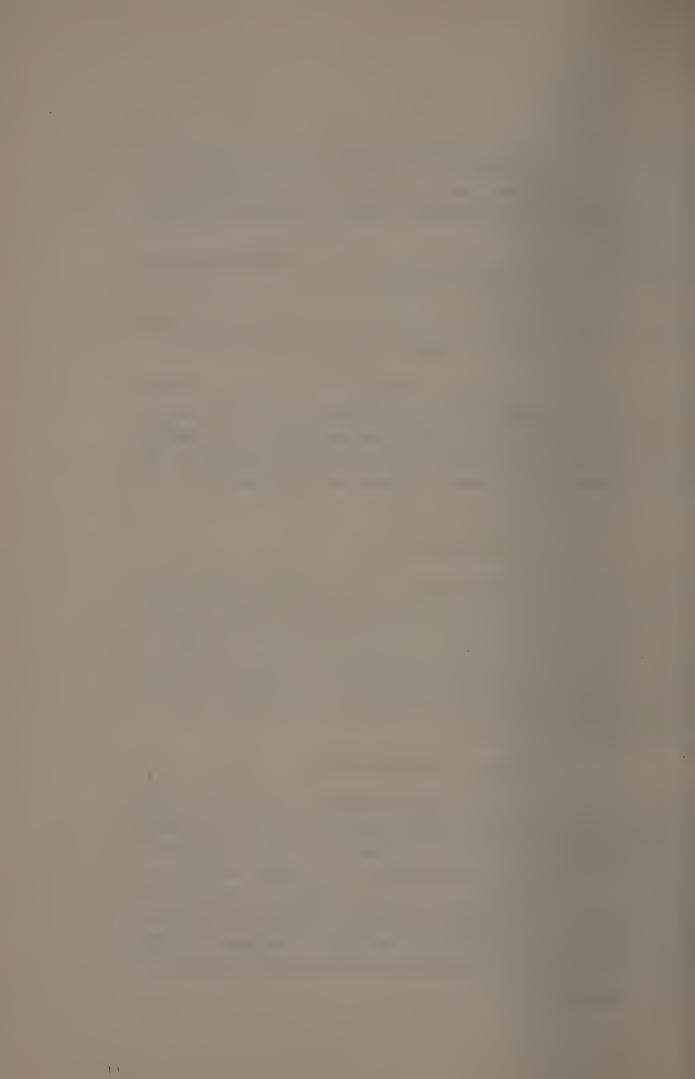
All to be carefully eleaned out before the vessel is delivered by the contractor; also during the progress of the work, the chips, shavings, dirt, &c., to be cleaned out daily, and particular eare must be taken that all foreign matter is removed and the parts thoroughly cleaned before the application of any paint or eement.

GROUNDING.

Great care is to be taken that the vessel does not at any time take ground; should this occur, however, before the contract is completed, the vessel will be docked, thoroughly examined, and all injury arising therefrom or from eoming in contact with wharf or floating objects must be repaired to the entire satisfaction of the superintending eonstructor, and at the expense of the contractor.

TESTING FORGED WORK.

All shackles, ring and eye-bolts, stopper-bolts, eyes, hooks, slips or triggers, all blocks, anchor-davits, struts, chain-plates, and boat-davits, &c., are to be tested by strain or proved in satisfactory manner. On no account are jumped-welds to be made in important forgings. If any forgings or other iron or steel work should be sub-let by the contractor, the sub-contractor shall be informed by the contractor that such forgings are to be done under the immediate supervision of the superintending constructor.

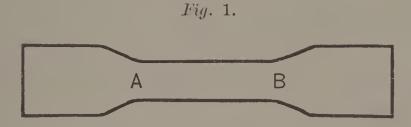


All other plates and shapes may be accepted if the weights vary between the specified weights and 5 per cent. below them.

All plates and shapes not being within the limits here specified may be rejected.

TESTS.

All material except boiler-plates should be tested by heats, as follows: A specimen ingot or bloom shall be selected and rolled into a plate or bar and test pieces cut therefrom, provided, always, that the test pieces shall have received no more working than that which the finished material from the heat would receive.



Four test pieces, of the form shown in figure 1, for plates—a square or round, in condition as finished at the rolls, may be used for the tests of shapes—shall be made and tested for each heat.

The length A B must be at least 8 inches of uniform cross-section of which the area should not be less than $\frac{1}{2}$ or more than $\frac{8}{10}$ of one square inch.

The reduction of the length A B should be just sufficient to prevent failure in the grip.

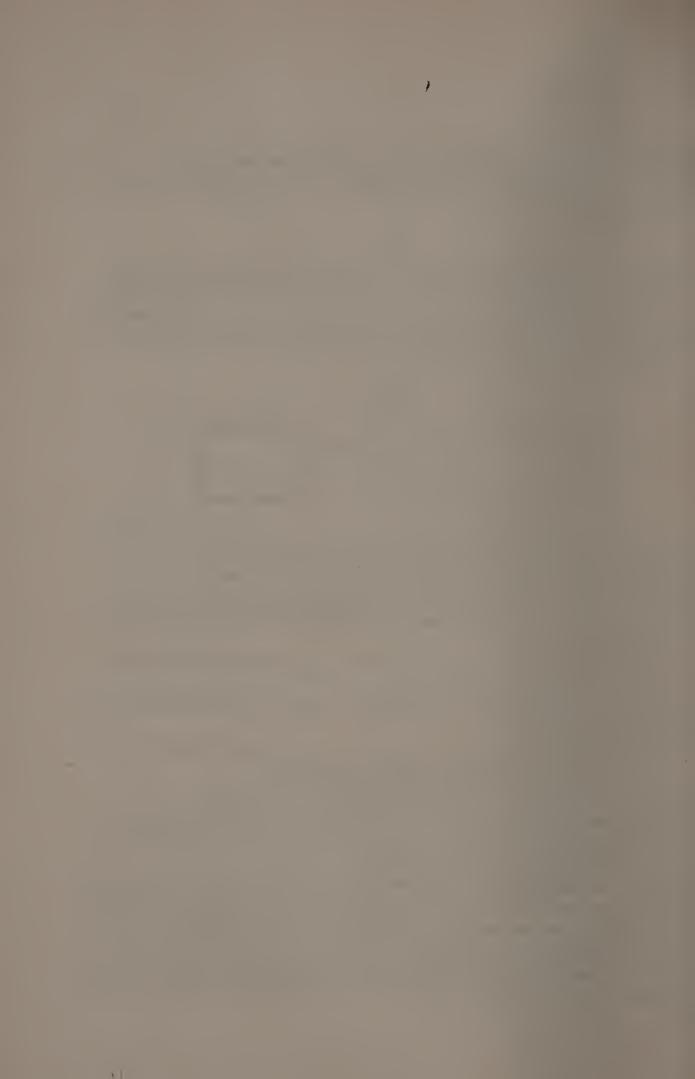
The test pieces must not be annealed unless the finished material is to be annealed.

Each test piece shall be submitted to a direct tensile stress until it breaks, and in a machine of approved character.

The initial stress to be 30,000 pounds per square inch.

The first load to be kept in continuous action for one minute. An observation to be made of the corresponding elongation measured upon the original length of 8 inches.

The stress then to be increased slowly until the principal elastic limit is determined, after which additional loads will be added at intervals of time as nearly as possible equal, and separated by half a minute; the loads to produce an increase of stress of 5,000 pounds per square inch of original section of the test piece until the stress is about 50,000 pounds per square inch of original section, when the



increments of stress should not exceed 1,000 pounds per square inch. Upon close approach to the probable ultimate strength, the load to be increased gradually and its maximum value carefully noted.

The final elongation to be that obtained after rupture.

A list of all ingots made from each heat must be supplied to the inspector. Each ingot should be stamped in his presence with the number of the heat. He should also see the test plate or billet cut off, stamped and rolled, and place a private stamp on it in such a way that each test piece will have the impression. The temp near one end.

CONDITIONS OF ACCEPTANCE.

In order to be accepted the average of the four test pieces must show an ultimate tensile strength of at least 60,000 pounds per square inch of original section, and a final elongation in eight inches of not less than 23 per centum.

Material which shows a strength greater than 60,000 pounds per square inch will be accepted, provided the ductility remains at least 23 per centum.

CASES OF FAILURE.

If the average of these four test pieces, numbers 1, 2, 3, 4 (called Test I), fall below either of the required limits, the ingot from which pieces 1, 2, 3, 4 were cut shall be rejected, and Test II made, consisting of pieces 5 and 6, cut from a second ingot; if the mean of the results of these two fall below either of the above limits, the entire lot shall be rejected. If it be successful, Test III, or the mean of pieces 7 and 8, cut from a third ingot shall decide.

If in any of the tests I, II, III, any single piece shows a tensile stress less than 58,000 pounds, or a final elongation less than 21 per cent., the ingot from which it was taken shall be rejected and that test considered to have failed, regardless of its average.

QUENCHING TEST.

IV.—A test piece shall be cut from each plate, angle, or beam, and after heating to a cherry-red plunged in water at a temperature of 82° Fahrenheit. Thus prepared it must be possible to bend the pieces under a press or hammer so that they shall be doubled round a curve of which the diameter is not more than one and a half times the thickness of the plates tested without presenting any trace of cracking.

These test pieces must not have their sheared sides rounded off, the only treatment permitted being taking off the sharpness of the edges with a fine file. Inspectors may require a cold bending test when considered necessary.

TESTING RED LEAD.

The contractor is to provide crucibles, &c., for testing red lead, and all red lead is to be tested and proved satisfactory by the superintending constructor before being used.

TESTING WATER-TIGHT COMPARTMENTS, TANKS, ETC.

All water-tight compartments are to be tested by filling the compartments with water as may be directed, and any defects which are discovered are to be made good, and the compartments re-filled and tested until found perfectly water-tight.

CEMENT.

A coating of cement or composition (principally composed of bitumen and Roman cement), as approved, is to be placed on the inside of the bottom and wherever else directed; to be of the necessary form and thickness, and no more, for carrying the water to the pumps. At the extremities of the vessel, and at other places where more than the ordinary bulk of cement is required, to be first given a thin coat of cement, and when this is dry to be filled with coke, and liquid cement is to be poured on repeatedly till the whole mass is solid and impervious to water. Care will be taken to have all plates, angles, &c., thoroughly cleaned before applying the cement. As far as practicable provision is to be made in building the vessel for rendering access to the different parts of the bottom, &c., as easy as possible, in order that the cement, &c., may be examined and repaired.

GENERAL FASTENINGS, QUALITY OF MATERIALS AND WORKMANSHIP.

All rivets are to be of steel, and must satisfy the printed code of tests supplied with this specification; those not less than $\frac{1}{2}$ inch in diameter to be made of a conical form under the head.

The breadth of the edge-strips, laps, and butt-straps, where not specified, and the size, form, and pitch of the rivets, to be as may be directed by the superintending constructor.

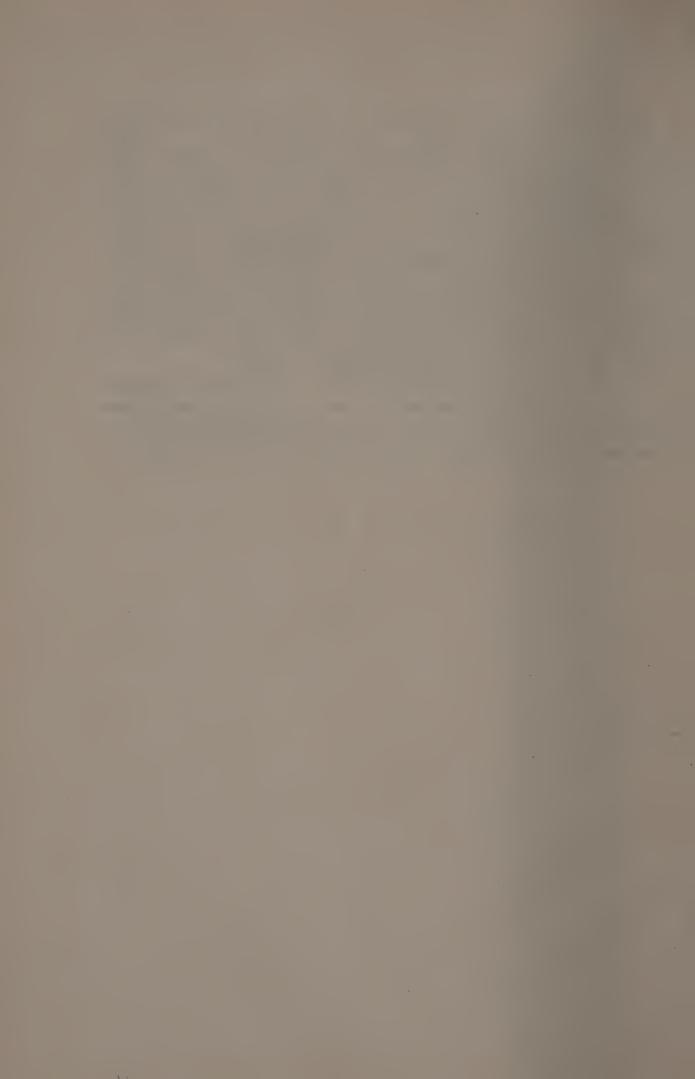
10. [2240]





The riveting is to be executed in a careful and workmanlike manner, the rivets thoroughly fitting the holes, and the greatest care is to be taken in punching to prevent unfair holes; all such holes are to be rimmed out before riveting, and a rivet suitable to the increased size of hole to be inserted. The counter-sinking is also to be carefully done. All rivets to be laid up, and all rivet-work to be completed in the manner required. The inspector may require any holes to be drilled and bolts turned for them, or he may substitute bolts for rivets, or make other changes of this kind, whenever he may think desirable, without additional charge.

The whole of the remaining bolts and screw-fastenings throughout the ship are to be of the very best materials and workmanship; to have copper or brass metal-fastenings in the internal and other fittings, where usual in the U.S. Navy.







TESTS OF STEEL FOR CRUISERS.

INSTRUCTIONS TO INSPECTORS.

The following rules are prescribed in order to insure the fulfillment of the clause of the act of Congress of August 5th, 1882: "Such vessels * * * * to be constructed of steel of domestic manufacture, having as near as may be a tensile strength of not less than sixty thousand pounds to the square inch, and a ductility in eight inches of not less than twenty-five per centum."

I. All ship-plates, beams, angles, rivets, bolts, boiler-plates, and stays to be inspected and tested at the place of manufacture by a naval inspector of material, and to be passed by him, subject to restrictions hereinafter mentioned, before acceptance by the ship-builders, whether Government or private, for incorporation into said vessels.

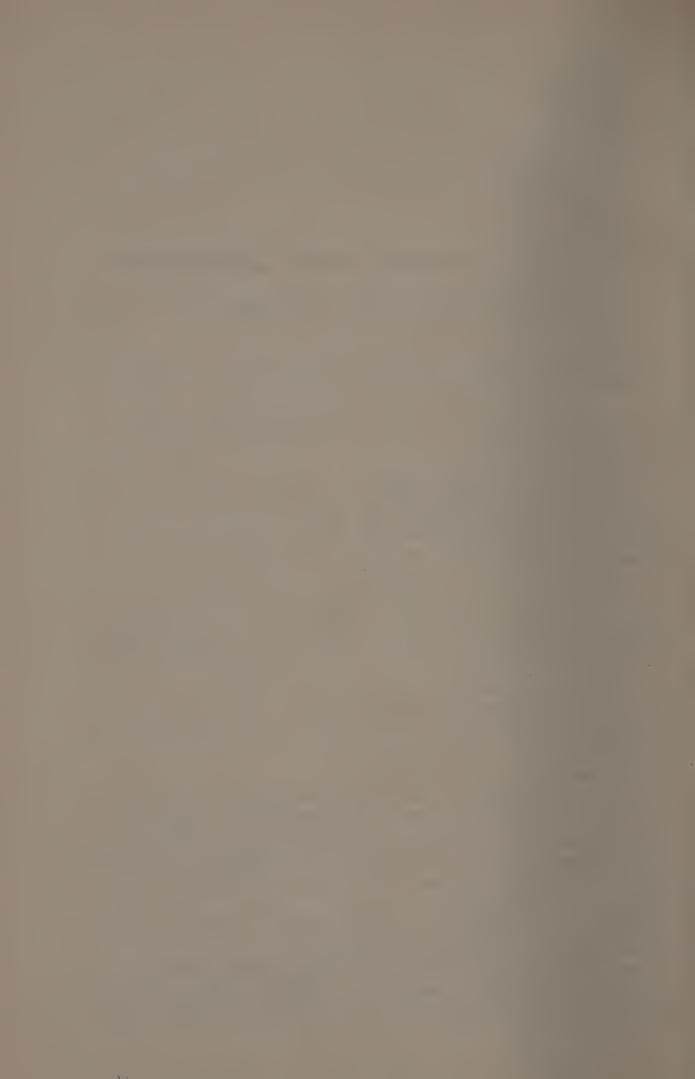
II. Every plate, beam, and angle, supplied for these vessels, to be clearly and indelibly stamped in two places, and with two separate brands: 1st, with that of the maker, which shall distinguish the name of the manufactory or company. 2d, with the regulation brand of the naval inspector of material. The latter not to be stamped upon any of the above-named material until it shall have passed an inspection for surface or other defects of manufacture and physical tests, and have been accepted by the inspector, and have been stamped with the maker's brand.

In case of small articles passed in bulk, the above-mentioned brands shall be applied to the boxing or packing-material of the objects.

No steel material to be received at the building-yards for incorporation into vessels except it bear, either upon its surface or that of its packing, both of these brands, as evidence that it has passed the necessary Government inspection.

III. The weights of all plates, beams, angles, &c., must be obtained by the inspector of material before delivery.

Plates of 12½ pounds per squarc foot or less, and strips and bars of 6 pounds per lineal foot or less, may be accepted if the weights vary between 3 per cent. above and 5 per cent. below the specified weights.



ANGLES, BEAMS, T-BARS, ETC.

V.—Angle-bars are to be subjected to the following additional tests: A piece cut from one bar in twenty to be opened out flat while cold under the hammer; a piece cut from another bar in the same lot shall be closed until the two sides touch while cold.

Bulb and T-bars are to be submitted to a closing test similar to that prescribed for angle-bars.

Bars submitted to these tests must show neither cracks, elifts, nor flaws.

RIVETS.

Each 1,000 pounds of rivets from the same heat of metal shall constitute a lot and be accompanied by two sample bars, each 18 inches long, for tensile test. These samples for tensile test shall be cut from the bars from which the lot of rivets is made, and be stamped with a number which shall also be placed on each box or package of that lot.

These samples to be subject to the same tensile test as that required for the plates.

The lot of rivets from which this sample bar does not fulfill the requirements of tensile strength and elongation required for plates is to be rejected.

From each lot six rivets are to be taken at random and submitted to the following tests, two rivets to be used for each test:

1st. Two rivets to be flattened out cold under the hammer to a thickness of one-half the diameter without showing cracks or flaws.

- 2d. Two rivets to be flattened out hot under the hammer to a thickness one-third the diameter without showing cracks or flaws.
- 3d. Two rivets to be bent cold into the form of a hook with parallel sides without showing cracks or flaws.

The acceptance of material under these tests will not relieve the contractor from the necessity of making good any material which fails in working or may be rejected by the inspector.















